Do They Know Their ABCs?

Letter-Name Knowledge of Urban Preschoolers

by

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ABSTRACT

This study analyzed the performance and growth in letter knowledge and letter identification skills of children across an academic year. Repeated measures analyses of variance were conducted on letter name knowledge measures administered at three time points for all participating children (N=177) and seven time points for children (n = 106) identified as below benchmark based on their initial performance on the *Test of Preschool Early Literacy* (*TOPEL*; Lonigan, Wagner, & Torgesen, 2007). The analyses were used to examine differences among children's performance based on a number of variables including initial classification as at- or below-benchmark, home language status, time, and quality of instruction in the child's classroom. Additionally, latent growth models were developed to evaluate relationships among the variables relative to the trajectory of growth of letter knowledge skills for children (n = 114) identified as below benchmark. The findings indicated positive growth for participating children, in terms of the numbers of uppercase letters they were able to identify, and some observable differences between identified groups of children. However, the differences and changes observed did not always meet levels of statistical significance. Across all analyses, age explained a significant portion of the variance in the number of letters children were able to correctly identify. Results suggest that early instruction and intervention can be effective in improving the alphabet knowledge skills of at-risk preschoolers; however, further research is needed to better identify and understand the factors that impact growth including individual, home, and educational variables.

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CHAPTER I

INTRODUCTION

Learning the alphabet is often regarded as a major childhood accomplishment, something that the child, parents, teachers, and grandparents all celebrate. A wealth of research (e.g. Hammill, 2004; Leppänen, Aunola, Niemi & Nurmi, 2008; National Institute for Literacy, 2008; Scarborough, 1998; Snow, Burns, & Griffin, 1998) substantiates this belief, recognizing the importance of alphabet knowledge in terms of a child's cognitive, academic, and language development. And while many children learn the names and functions of letters through experience and incidental exposure (Elliott & Olliff, 2008), the alphabet is generally the first concept taught in more formal school and preschool settings, as it is seen as a "gateway to learning and knowledge" (Logan, 1986, p. 17).

While learning the alphabet is seen as a significant milestone in the lives of individual children, the development of a phonetic alphabet is seen as a major milestone in the history of the human race (Diringer, 1968; Taylor, 1883). Though many societies and cultures had discovered and utilized the art of writing, their non-alphabetic systems limited their ability to communicate concrete and finite concepts. Conversely, the simplicity and generalizability of the phonetic alphabet made it accessible to the general population and broadened its use (Taylor, 1983). Diringer (1968) called the alphabet the last, most highly developed, most convenient, and most easily adaptable system of writing.

According to Logan (1986), "the magic of the phonetic alphabet" is not only in its use as a writing system, but that it is also a system for organizing information (Logan, 1986, p. 17). He further states that many of the foundational ideas of Western society, including science, law, religion, economics, and mathematics are tied to the phonetic alphabet (Logan, 1986). In

learning the alphabet and learning to read, children in Western cultures also learn the skills of abstraction, analysis, rationality, and classification (Logan, 1986). With the accessibility of the phonetic alphabet, more and more people also gained access to literacy, the ability to read and write (Logan, 1986; Taylor, 1883). Particularly in a time when literacy served as a societal barrier to participation in decision-making processes, the phonetic alphabet opened doors and led to a "democratization of knowledge" (Logan, 1986, p. 216). According to Logan, writing became more than a mode of communication; it became an active force in the creation of society. These new skills allowed individuals to organize information systematically and to preserve the information and accomplishments of one society to form the foundation for later knowledge and learning. Taylor (1883) went so far as to call the alphabet the "triumph, instrument, and the register of our race" (p. 2).

Historical Perspectives

As was previously mentioned, the concept of writing was developed long before the advent of the alphabet. Recognizing the utility and necessity of writing as a permanent form of communication, many cultures and societies had developed and used systems of writing, with the first forms of writing dating back to approximately 30,000 B.C. (Logan, 1986). These early forms of writing primarily consisted of notches in bones and sticks likely used to record quantitative data. Later forms of writing used by the Mesopotamians, Egyptians, Cretans, and Hittites were ideographic or pictorial, capturing a concept or object in its depiction (Diringer, 1968). While these systems were beneficial in terms of their permanence as a record, they were limited in the content they could record (Taylor, 1883).

While there is some disagreement regarding the creation and development of the first alphabet (Diringer, 1968), many scholars agree that the first alphabet was likely developed

during the Hyksos period (from 1730-1580 B.C.) by the Semitic-speaking people in Canaan (Diringer, 1968; Logan, 1986). Popularly, the development of the alphabet is attributed to the Phoenicians, an ancient civilization in Canaan (Diringer, 1968; Logan, 1986, Taylor, 1883). The great achievement of the Semitic or Phoenician alphabet is not in the creation of the symbols as a means to communication, but rather in its reliance on one sign for each consonant sound (Diringer, 1968; Taylor, 1883). This first true alphabet consisted of 22 symbols, but did not include notations for vowels.

From this proto-Semitic alphabet, scholars are able to follow the development of the alphabet across many of the world's languages eventually arriving at today's English alphabet (Taylor, 1883). The English alphabet can be traced to the Latin family of alphabets which were derived from local forms of the Greek alphabet (Taylor, 1883). Although there are some scholars who disagree, classical writers, Greek tradition, and legend all attribute the Greek development of the alphabet and writing to the Phoenicians (Diringer, 1968; Taylor, 1883). According to tradition, the concept of the alphabet was introduced to the Greeks sometime between 100 and 700 B.C. by Cadmus of Thebes who had lived in Phoenicia (Diringer, 1968; Logan, 1986). Further scholars agree that the similarities between the primitive Greek alphabet and early Semitic alphabets including the names, order, numbers, and forms of the letters are further proof of its Semitic origins (Taylor, 1883). The Greeks modified the Phoenician alphabet by adding vowels and three extra consonants (Logan, 1986). The Greek alphabet therefore represents the first perfect alphabet as it presented the ability to accurately and completely transcribe every word or combination of sounds with unique visual symbols (Logan, 1986; Taylor, 1883). This ability to accurately convey ideas, beyond the concrete and present, allowed writing and communication to broaden to include the abstract and theoretical. As a

result the Greeks began to develop a vocabulary for these concepts such as matter, space, time, change, and other philosophical ideas (Logan, 1986).

The alphabet was then adopted by the Etruscans and eventually the Romans who changed the letter names, inserted and replaced some letters in the development of the Latin alphabet and language (Diringer, 1968; Logan, 1986). Latin became the international tongue of the European world as the language of the Roman Catholic Church (Diringer, 1968). Additionally, Latin became the *lingua franca* of scholarship due to the classic scholarship carried on by the Church, particularly in a time and place where education was almost entirely monastic (Diringer, 1968; Logan, 1986). Even during the Dark Ages, when the social and cultural use of the alphabet and literacy declined, the tradition of alphabetic literacy was carried on by the Church; Christianity, like Judaism and Islam, was a religion based on sacred texts, requiring religious scholars to preserve and maintain literary skill and ability (Logan, 1986).

Following the development of the phonetic alphabet, the next major innovation in terms of literacy was the invention of the printing press (Logan, 1986). Phonetic and alphabetic languages were particularly impacted since they were suited for printing by using movable type (Logan, 1986). The printing press greatly multiplied the availability of alphabetic texts in terms of the number of titles available as well as their accessibility (Logan, 1986). The printing press also allowed for texts to be printed in the vernacular of the people, no longer requiring individuals to learn a second language. As a result the number of people who could read increased dramatically, partially because an individual could learn on his own, with little or no instruction (Logan, 1986). Reading and writing became more common, no longer exclusively for the privileged or the priestly (Diringer, 1968), as the emerging middle class became the primary market for printers (Logan, 1986).

Mass produced books also facilitated the growth of publicly supported schools and libraries (Logan, 1986). The early Israelites had been the first to achieve a universal level of literacy. They were driven by the Biblical commands to teach the covenants and commandments to their children (Deuteronomy 6:6-7; New International Version), a process facilitated by the development of the Hebrew phonetic alphabet also traced to the Phoenicians (Logan, 1986). Other societies taught reading and writing, but typically reserved these lessons for the sons of the privileged. Roman schoolboys were taught the art of reading and writing with models and toys shaped like letters to further their familiarity (Logan, 1986).

As literacy became more accessible first through phonetic language and then bolstered by the availability of print, the social importance and feasibility of education also became a possibility. Educational reformers such as Comenius began to advocate for universal education, regardless of race, nationality, sex, or social status (Dobinson, 1970). Comenius (as cited in Dobinson, 1970) also emphasized the importance of beginning education in early childhood, stating, "It is easier to educate than to re-educate" (p. 18). Comenius wrote the first picture book for children, *Orbis Pictus*, first published in 1657. The book begins with an "Invitation" to learn from a Master to a young Boy. The Master explains:

> "Before all things, though oughtest to learn the plain sounds, of which man's speech consisteth; which living creatures know how to make and thy Tongue knoweth how to imitate and thy hand can picture out. Afterwards we will go into the World, and we will view all things. Here thou hast a lively and Vocal Alphabet" (p. 2).

This is followed by a two page chart listing the sounds, connecting them with the animals that make those sounds. Comenius' alphabet had 24 letters, omitting the "J" and "V."

This belief in the value of education eventually spread and crossed the Atlantic to a fledgling republic, particularly as the principles of the Declaration of Independence began to be articulated and appreciated (Educational Policies Commission, 1955). America's leaders began

to recognize that for the nation to be successful, a nation in which all White males would be able to vote regardless of their wealth or property, these citizens needed to be prepared for this responsibility (Warren, 1988). In his Farewell Address to the nation at the end of his presidency, George Washington (as cited in Educational Policies Commission, 1955) said, "Promote then as an object of primary importance, Institutions for the general diffusion of knowledge" (p. 5). Other leaders such as John Adams, James Madison, and John Quincy Adams also believed that the foundation of a successful democratic society would be in the education of its citizens (Educational Policies Commission, 1955). Many of the first public schools in the United States were due to local initiatives and at times privately funded; these early common schools began teaching basic skills such as reading, writing, and arithmetic, in addition to religious and moral values. Under the influence of leading citizens such as Horace Mann, the campaign for universal education gathered momentum throughout the Jacksonian and antebellum periods with the common goals of providing a basic education for all citizens in order to have an intelligent body of voters and to continue to supply capable leaders chosen on their merits (Educational Policies Commission, 1955). At a minimum, schools were required to develop literate citizens, but had a further purpose of developing and equipping fully functioning citizens to participate in and serve society as a whole (Warren, 1988).

Modern Day Perspectives

President George W. Bush in 2002 said, "On the first day of school, children need to know letters and numbers. They need a strong vocabulary. These are the building blocks of learning, and this nation must provide them" (p. 2). In his statement President Bush acknowledged several important concepts. First he acknowledged the responsibility of the nation in providing educational opportunities for all of its citizens, including children. Second,

in recognizing and identifying these building blocks, President Bush acknowledged the cumulative process of education and academic learning. This cumulative process involves both mastering new skills and improving already existing skills (Duncan et al., 2007) and begins much earlier than one might expect. For example, math and reading skills at the point of school entry are consistently associated with higher levels of academic performance in later grades (Duncan, et al., 2007).

West, Denton, and Germino-Hausken (2000) report that as many as two-thirds of America's first time kindergartners begin school already recognizing letters, numbers and shapes. However, those early abilities vary consistently as a function of multiple risk factors, including race/ethnicity and poverty (Downer & Pianta, 2006). Children who live in poverty and who are members of ethnic and linguistic minorities consistently perform at lower levels of achievement (National Association for the Education of Young Children & National Council of Teachers of Mathematics, 2002). For example, Meisels, Xue, and Shamblott (2008) report that approximately 40% of a sample of Head Start children, children from low socioeconomic households, performed significantly below average on standardized reading measures and over 60% were considered at-risk in mathematics. This is particularly troubling in light of additional research which indicates that children's pathways for learning and for educational success are formed during early childhood and primary grades (Hamre & Pianta, 2001). Downer and Pianta (2006) and Snow, Burns, and Griffin (1998) highlight the implications for a better understanding of the factors that impact early childhood learning and development by reporting that there are relatively few opportunities after third grade to alter a child's academic trajectory.

Based on the available research, many professionals working at the early childhood and preschool level seek to implement a prevention model in terms of the types and levels of services

and interventions provided to children. A prevention model encourages a proactive approach to identifying children at risk for later difficulties and implementing instructional programs and strategies that enhance their opportunities for learning and success (Justice & Pullen, 2003). Prevention models have been advocated and implemented to address a variety of skills and difficulties ranging from academic problems to social and emotional well-being and mental health. In terms of academic or preacademic skills, a prevention model is particularly appropriate for early childhood; it is during this time period that achievement gaps first appear and are easiest to address (Perez-Johnson & Maynard, 2007). Early childhood is an ideal opportunity and time period for targeted instruction and intervention. Advances in understanding the brain and cognitive development have shown that early experiences are critical in forming foundations and connections for future learning (National Research Council and Institute of Medicine, 2000; Noble, Tottenham & Casey, 2005; Perez-Johnson & Maynard, 2007). Similarly, as children get older and academic gaps increase and compound, effective intervention becomes more difficult and costly (Perez-Johnson & Maynard, 2007). However within a prevention model, important questions about identifying at-risk children remain. These include questions regarding the reliability and predictive validity of early childhood assessment tools, instructional methodology, and individual factors and variables that impact children's growth and learning before, during, and after the implementation of preventative strategies.

In response to answering research questions regarding the importance of early childhood learning and development, many early childhood initiatives have been developed and funded. These programs focus on improving the educational opportunities and outcomes of children throughout the country. One such initiative is the Early Reading First (ERF) program designed to increase preschoolers' school readiness (Jackson et al., 2007). ERF is a major federal

initiative to improve early literacy instructional practices in preschool programs in the United States. ERF programs are funded by the Department of Education to prepare young at-risk children to enter kindergarten with the language, cognitive, and early reading skills needed to prevent early reading difficulties and to ensure school success. Specifically, the goals of the ERF program are as follows:

- to support local efforts to enhance early literacy development of preschoolers through research based strategies and professional development
- to provide preschoolers, specifically those from low-income families with cognitive learning opportunities and environments to help them acquire basic knowledge and skills
- to incorporate research based activities to encourage the development of preschoolers' oral language, phonological awareness, print awareness, and alphabetic knowledge
- to use screening measures to identify preschoolers at-risk for reading failure (US Department of Education, n.d.)

With an increased emphasis on improving educational outcomes, there has also been extensive research into the variables and factors that contribute to academic success. For example, the National Reading Panel identified five essential components of reading instruction: phonemic awareness, phonics, fluency, vocabulary, and comprehension (NICHD, 2000). These components were found to be necessary for effective reading instruction. The results of the National Reading Panel have been influential in guiding educational policy and practice in the United States, as evidenced by the inclusion of the five components in the No Child Left Behind Act of 2001 (Learning Point Associates, 2004). However, the National Reading Panel did not extend their study to look at the educational impact of early childhood experiences or instruction. The National Early Literacy Panel was convened to review the literature specific to early

childhood to better understand the development of early literacy skills (National Institute for Literacy, 2008).

In their 2008 report, the National Early Literacy Panel identified skills that are precursors to later literacy development. These six skills include phonological awareness, rapid automatic naming of letters or digits, rapid automatic naming of objects or colors, writing name, phonological memory, and alphabet knowledge. These variables all had medium to large predictive relationships with later reading assessments, even after the effects of other variables such as IQ and socioeconomic status were considered (National Institute for Literacy, 2008). Phonological awareness is the ability to identify and manipulate the auditory sounds in words, for example, segmenting words and rhyming. Rapid automatic naming of either letters and digits or objects and colors is the fluency with which a child is able to correctly identify a sequence of random items. Name writing is fairly straightforward, but also includes the ability to write the letters of one's name in isolation. Phonological memory is the ability to retain spoken information for short periods of time. Alphabet knowledge is defined as the knowledge of the names and sounds associated with printed letters. It is the last of these skills, alphabet knowledge, which is of primary interest for the present study.

Alphabet knowledge has been shown to be the best predictor of children's later reading and spelling abilities (Hammill, 2004; Scarborough, 1998; Schatschneider, Fletcher Francis, Carlson, & Foorman, 2004). Further, other studies have shown alphabet knowledge to be the strongest individual predictor of future reading achievement, predicting both reading comprehension and reading fluency (Leppänen et al., 2008; Snow et al., 1998). However, there is significantly less research about how children develop alphabet knowledge.

In an effort to further understand the development of alphabet knowledge in preschoolers this study will seek to answer the following research questions:

1. Do children who are identified as average (Benchmark) or below average (Below Benchmark) on a standardized early literacy measure perform differently on alphabet knowledge tasks over time after controlling for age?
2. Is the above relationship between children's performance on the TOPEL and alphabet knowledge tasks impacted by a child's home language status?
3. After controlling for age, is the trajectory of children's letter knowledge growth different for below benchmark children based on the quality of their classroom instruction?

Definition of Terms

Alphabet knowledge is generally defined as knowledge of both the letter name and sound (National Institute for Literacy, 2008). In some cases, alphabet knowledge is differentiated from letter knowledge or letter-name knowledge, which is the extent to which a child is able to correctly identify letters by their names. However, the way the terms are used and measured differs across studies (Molfese et al., 2006). This study will investigate this subset of alphabet knowledge, specifically letter knowledge or letter-name knowledge.

Letter knowledge: Measured as the total number of letters identified correctly out of 26 uppercase letters.

Age: The child's age in months, rounded to the nearest month as of September 1 of the first year of the child's participation in the program.

Ethnicity: The ethnic group with whom the child most identifies with, or in this case, the group with whom the parent feels their child most identifies with. For this study the parents were able to choose from: White/Caucasian, African American, Hispanic, or other.

Home language: The language that is primarily spoken at the child's home, or the language with which the child is most familiar both in understanding and speaking, English, Spanish or other. Children whose parents indicate that the home language is something other than English will be identified as English Language Learners (ELLs).

Significance of the Study

While there is ample evidence that alphabet knowledge—and by extension letter knowledge—is a key precursor to reading, it is not yet clear the specific pathway or role letter knowledge plays in the acquisition of literacy skills. This study seeks to expand upon current understanding of the development of letter knowledge of preschoolers in an urban core setting. This study will look at children's growth in terms of letter knowledge across the academic year, and it will compare the learning of children from English-speaking homes with the learning of ELLs. It will also evaluate the impact of classroom instruction on the trajectory of growth observed.

Based on the outcomes of the study, new information will be added to the current knowledge in the field concerning children's letter knowledge and the factors that influence children's early learning.

Chapter II

REVIEW OF THE LITERATURE

In an era of accountability ushered in by federal mandates such as the No Child Left Behind Act (NCLB, 2001) and the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), a focus on the prevention and remediation of learning problems and disabilities has become more prominent (Burke, Crowder, Hagan-Burke & Zou, 2009). As schools strive to have all students performing at grade level in math and reading, the early detection and remediation of difficulties has become even more important. Research has shown once children fall significantly behind in reading proficiency, the likelihood of their catching up to grade level diminishes (e.g. Shaywitz & Shaywitz, 2004). Therefore, in order to prevent reading failure, children need to begin their education with a solid early literacy foundation (Burke et al., 2009).

The review of the literature is presented in eight sections, each providing information regarding concepts and factors associated with the present study. The first section summarizes the literature on the importance of early literacy, as well as the concepts and skills that comprise early literacy. The second section reviews the literature on alphabet knowledge as an indicator of early literacy development, followed by the third section, which focuses more specifically on the literature relating to letter knowledge. The fourth section summarizes the literature on a number of demographic and individual differences variables that impact children's literacy development. The fifth section presents literature relating to the role of early childhood care and early childhood education. The sixth section then focuses on early literacy instruction. The seventh section provides an overview of tiered instruction, including Response to Intervention models, as a framework for early literacy instruction. The final section summarizes the literature regarding fidelity and treatment integrity.

Early Literacy

Learning to read is one of the most important milestones of childhood and is critical for a child's success in school, as well as later in life (Missall et al., 2007) as children who learn to read, and read well, read more and, as a result, acquire more knowledge across multiple domains (Stanovich, 1986). Learning to read is a dynamic process, building on years of literacy experiences, and is the result of a hierarchical process and the integration of multiple skills (Adams, 1990; Denton & West, 2002; Johnston, Anderson, & Holligan, 1996; Ritchey, 2004; Shanahan, 2005). Early literacy or emergent literacy is used to describe the reading and writing behaviors that precede the development of conventional literacy and reading (Riley, 1996; Sulzby, 1989). Research has shown that early literacy skills, including reading, writing, and oral language skills, develop concurrently during the first five years of life, long before formal schooling (Missall et al., 2007; Riley, 1996). According to Justice and Pullen (2003), emergent literacy is the product of a sociocultural process as early literacy skills are highly influenced by the social and cultural contexts where the child is raised. These early literacy skills are the foundation for reading and the earlier these skills are acquired, the more efficiently and effectively additional skills can be learned and mastered (Missall et al., 2007). Findings have consistently demonstrated stability in literacy skills over time, emphasizing the importance of preschool skill development, as preschool and kindergarten children who lack proficiency in pre-reading skills are more at risk for becoming poor readers (Hammill, 2004; Whitehurst & Lonigan, 1998).

Although the terminology may differ, there is consensus in recognizing that there is a wide range of pre-reading literacy skills children develop before they are able to decode individual words (Whitehurst & Lonigan, 1998). According to some research the two key areas

that are most predictive of later reading development are phonological awareness and print awareness (Lonigan, Burgess, & Anthony, 2000; Storch & Whitehurst, 2002). Further, Lonigan and colleagues describe a continuum of early literacy skill development, specifically phonological awareness skills (Phillips, Clancy-Menchetti, & Lonigan, 2008). This developmental continuum begins with larger units of sound and progresses to successively smaller units of sound, for example from word to syllable and eventually phoneme awareness. At the same time in their development, children are acquiring alphabet knowledge skills in terms of letter-name and letter-sound knowledge. It is this confluence of skill development that allows children to transition from phonological and phonemic awareness instruction to phonics instruction focusing explicitly on the connection between written letters and words and their sounds.

The National Early Literacy Panel (2008) identified six pre-reading skills as described in the previous chapter, while Tunmer and Bowey (1984) identified and described four types of linguistic awareness that are preconditions to reading: word awareness, phonological awareness, form awareness, and pragmatic awareness. According to Bialystok (1991), children must have metalinguistic knowledge that goes beyond the meaning of language, and focuses on the structure of language before they are ready to learn to read. These early literacy skills begin to be observed at about the same time developmentally (Mason, 1980). Researchers demonstrate children's beginning understanding of the relationship between spoken and written language as they begin to connect graphemes with words and sounds (Bailet, 2001; Whitehurst & Lonigan, 1998). For example, according to Levin and colleagues, even pre-readers who do not yet know the names of letters can be very good at recognizing specific words (Levin, Shatil-Carmon, & Asif-Rave, 2006). Specifically, many young children can recognize their own names (Villaume

& Wilson, 1989), names of classmates (Share & Gur, 1999), as well as commercial print (Masonheimer, Drum, & Ehri, 1984). These children's "reading" of words is based on visual cues (Levin et al., 2006). At some point, readers shift from using visual cues to phonetic cues, which appears to be at least partially dependent upon pre-readers level of letter knowledge (Levin et al., 2006).

In further attempts to better understand the construct of early literacy, other researchers have investigated the relationships among key early literacy skills. For example, extending the work of the National Early Literacy Panel in identifying the six skills most strongly related with later reading assessments, further research has identified concurrent, recursive, and reciprocal relationships among these variables. Specifically, several studies have suggested a reciprocal relationship in the development of phonological awareness and alphabet knowledge, with improved phonological awareness skills facilitating growth in letter knowledge and vice versa (Burgess & Lonigan, 1998; Carroll, Snowling, Hulme, & Stevenson, 2003; Lonigan, 2006; Stahl & Murray, 1994). Burgess and Lonigan (1998) expanded on these findings to suggest that letter knowledge may be necessary for children to develop higher levels of phonological sensitivity or awareness, but not lower levels of phonological sensitivity. This means that children may be able to identify rhymes and syllables, but be unable to recognize initial or final sounds until they have some understanding of the letters of the alphabet. However, in their study they also point out that both letter knowledge and phonological sensitivity independently predict growth in literacy skills, indicating that letter knowledge and phonological sensitivity are not completely overlapping. Further, because they independently predict growth, it is unlikely that both letter knowledge and phonological awareness are simply measuring the same underlying variable; rather, they are unique skills that at their most basic levels are reciprocally related (Burgess &

Lonigan, 1998). Similarly, deJong and Olson (2004) found that children's phonological memory and ability to remember and repeat non-words had a significant effect on their letter knowledge. More specifically, they found that individual differences in phonological memory had a causal effect on initial letter learning, but did not have an effect in the second year of instruction.

There is also substantial evidence of significant relationships between writing sophistication and letter knowledge in preschool children (Molfese, Beswick, Molnar, & Jacobi-Vessels, 2006). According to Diamond, Gerde, and Powell (2008) children's knowledge of letter names and writing skills, particularly name-writing skills, seem to reinforce one another, which they deem recursive influences. Writing integrates important early literacy skills and sensitizes children to attend to the unique qualities of each letter and distinguish them from all others (Diamond et al., 2008; Whitehurst & Lonigan, 2001). Children may be particularly interested in the characteristics of the letters in their own name, making writing an ideal platform for learning the alphabetic principle and to begin to connect letters to the sounds and words they represent (Diamond et al., 2008; Drouin & Harmon, 2009). However, Drouin and Harmon found that name-specific letter recognition appeared to better differentiate children who were more able from those who were less able in terms of early literacy skills. Name writing did not differentiate accurately, although they did observe incongruities. After grouping their sample according to whether they recognized all, some or none of the letters in their name, as well as whether they could write all, some or none of the letters in their name, they found that 47% showed some discrepancy in that they recognized, but could not write, or could write, but not recognize the letters of their name. Regardless, writing seems to incorporate several early literacy skills and provides children with an avenue to recognize and master the alphabetic principle involving letter recognition and initial sounds, and eventually rimes, syllables,

morphemes, regular words, and irregular words (Carnine, Silbert, Kame'enui, & Tarver, 2004; Diamond et al., 2008). Additionally, children's writing reflects their progress in understanding of letters moving from conceptual to formal and symbolic (Bialystok, 1991).

The research has shown children who gain confidence and familiarity with the sublexical or pre-reading components of literacy, including skills such as recognizing letters and sounds, will be less likely to have reading problems and more likely to become proficient and successful readers (Burke et al., 2009). However, it is also evident that although these skills are important in the development of reading, they are "necessary but not sufficient" in terms of developing successful and fluent readers, in that they seem to play a more prominent role in the development of basic skills rather than in the development of more complex skills (Good, Simmons, & Kame'enui, 2001, p. 265).

Alphabet Knowledge

Alphabet knowledge has been found to be one of six early indicators of literacy skills that are predictive of later reading ability and, at school entry, is one of the strongest predictors of both short and long term reading success (National Institute for Literacy, 2008; Stevenson & Newman, 1986). However, the construct of alphabet knowledge is not used and defined consistently across the literature. Alphabet knowledge generally includes knowledge of letter names and sounds (National Institute for Literacy, 2008), but other terms including alphabet learning and letter knowledge may also be used. In their recent meta-analysis of alphabet learning and alphabet knowledge, Piasta and Wagner (2010) define alphabet knowledge as "children's familiarity with letter forms, names, and corresponding sounds, as measured by tasks of recognition, production, and writing tasks" (p. 8). Several studies have shown that alphabet knowledge is the strongest individual predictor of future reading achievement, predicting both

reading comprehension and reading fluency (Leppänen et al., 2008; Snow et al., 1998). Leppänen et al. (2008) conducted a longitudinal study of children in Finland and assessed their literacy skills at the beginning and end of kindergarten, at the end of first grade, and at the end of fourth grade. They found that the best predictor of reading comprehension and fluency at the end of fourth grade among a number of variables was letter knowledge, which in their assessments included naming and writing letters. Similarly, in Hammill's (2004) comparison of three different meta-analyses of studies on early childhood predictors of reading ability, alphabet knowledge was one of only three predictor variables to consistently exhibit a large effect size, mirroring the results of the National Early Literacy Panel (2008) that found alphabet knowledge to be a robust predictor of later reading abilities.

While there is ample evidence supporting a strong relationship between alphabet knowledge and later reading ability, many of the studies have been correlational, indicating a relationship, but with no explanation as to the how or why the relationship exists. Children's first achievement in terms of letters and early literacy is typically procedural, reciting the alphabet by rote memory without attaching a meaning or significance to the individual letters. When the letters can be taken out of context and recognized individually, they are understood but still treated as objects, representing formal, but not symbolic knowledge (Bialystok, 1991). More developed and complete alphabet knowledge, which includes an understanding of the letters and their sounds, illustrates a child's ability to recognize the symbolic function and purpose of written letters and language, and identifies young children transitioning between emergent literacy and beginning reading (Riley, 1996). Therefore, even though alphabet knowledge may not cause improvements in reading, it may have indirect effects that facilitate the learning-to-read process (Bradley & Jones, 2007). Alphabet knowledge helps to develop

phoneme-based phonological representations (Treiman & Bourassa, 2000). Learning the alphabet provides children with a foundation that is likely to facilitate their ability to read and write (Bradley & Jones, 2007). Alphabet knowledge therefore seems to represent a "watershed event" in the development of reading abilities (Justice, Pence, Bowles, & Wiggins, 2006, p. 375).

Letter Knowledge

Knowledge of letter names has long been shown to be one of the best single predictors of beginning reading achievement, an even better predictor than IQ (Bond & Dykstra, 1967; Chall, 1967; Wilson & Flemming, 1938). Further, letter knowledge is considered one of the twin foundations of early literacy and skill development (Byrne, 1998; deJong & Olson, 2004). Letter name knowledge perhaps serves as children's introduction to understanding the alphabetic principle as they begin to connect sounds to symbols by learning the letter names (Bailet, Repper, Piasta, & Murphy, 2009). Additionally, letter name knowledge may have a much more influential role in the early stages of literacy development because it encourages the use of a phonologically-based strategy in early spelling and reading (Foulin, 2005).

Letter name learning appears to be similar to learning new words initially; however, learning a letter's name also teaches children about its symbolic function (Ellefson, Treiman, & Kessler, 2009; Treiman, Kessler, & Pollo, 2006). According to deJong & Olson (2004), letter learning is a two-step process. The first step involves a temporary phonological representation of the letter name being formed in the phonological memory. Then a permanent connection must be made in long term memory, pairing the phonological representation with the shape and form of the letter (deJong & Olson, 2004). According to cognitive explanations, children can more easily associate a graphic shape with a name that is syllabic rather than a single phoneme which is harder to discriminate and reproduce, making it easier to learn letter names rather than sounds

(Share, 2004; Treiman & Kessler, 2003). Additionally, one-to-one correspondence exists between the shapes of letters and their names, but not with the letter shapes and sounds (Levin et al., 2006). In overcoming some of these difficulties, letter name knowledge may be particularly beneficial because letter names are usually phonetically iconic, meaning they contain the phonemes they represent (Ellefson et al., 2009). According to Foulin (2005), when letter names include their letter sound, as in many alphabetic languages, for example, French, English, and Arabic, letter name knowledge serves as a foundation on which children build as they learn letter-phoneme relationships. Specifically, the benefit of letter name knowledge is stronger when the letter names follow the acrophonic principle, meaning the initial phoneme of the letter's name corresponds to the letter's sound, as in the letter 'b' (Ellefson et al., 2009, Foulin, 2005). Children's use of letter names in their initial understanding of the letter sounds can be seen in their early attempts at writing and spelling, a pattern that has been observed among children in the United States, France, Israel, and Brazil (Ellefson et al., 2009; Jaffré, 1992; Levin, Pattel, Margalit & Barad, 2002; Pollo, Kessler, & Treiman, 2005).

Other research has looked more specifically at what letters are learned and some of the individual and global factors that affect letter knowledge. Justice et al. (2006) found that although the order in which children learn letters is highly variable, it is influenced in systematic ways. For example, children were more likely to know letters in their first name, specifically the first letter in their first name (Justice et al., 2006; Treiman & Broderick, 1998). Additionally, children were slightly more likely to know letters at the beginning of the alphabet (Justice et al., 2006; McBride-Chang, 1999; Treiman & Broderick, 1998). Treiman, Kessler, and Pollo (2006) also determined that children were more likely to be able to correctly identify more common letters as compared to less common letters. In contrast, the study also demonstrated that children

have more difficulties identifying letters that are visually similar and those that have similar names. Studies by Courrieu and DeFalco (1989) and Worden and Boettcher (1990) have shown that preschoolers tend to have more difficulties with lowercase letters and have less difficulties with and are able to correctly identify more uppercase letters first. In summary, there are both extrinsic and intrinsic factors that seem to influence children's learning of individual letters (Justice et al., 2006). Children's ability to learn and retain the names of letters is influenced by children's exposure to the letters in their own names and the environment, as well as by the phonological features of the letters themselves.

Letter knowledge is clearly important for learning to read, specifically learning to read alphabetic languages (de Jong & Olson, 2004). According to Foulin's (2005) review of the relevant literature, evidence from children's use of letter names in spelling and reading suggests that letter name knowledge provides a bridge to phonetic reading strategies, thereby setting readers on the path towards conventional and formal literacy. Additionally, according to Foulin, the pattern and strength of the results confirms not only what he calls the letter-name effect, but also illustrates that the benefits of learning letter names outweigh the potential drawbacks, such as assuming sounds from letter names inappropriately. In a comparison study of children in England and America, Ellefson and colleagues (2009) sought to further compare the benefits of learning letter names versus letter sounds. According to the study, children in America are traditionally taught letter names first, both formally in preschool and classroom settings as well as by parents. Alternatively, early childhood experiences in England tend to emphasize letter sounds first, with letter names not being formally introduced until the end of the first year of formal instruction. The results of their study indicate that children learn what they are taught. Further, the first set, either letter names or sounds, that children learn are mere labels learned and

memorized, with little or no connection to the alphabetic principle. However, the first set helps to give meaning to the second set learned. According to the authors, the results of the study indicate that there is no benefit to learning one before the other (Ellefson et al., 2009).

In summary, there is a substantial amount of empirical evidence that has been accumulated and reviewed that illustrates the importance of letter knowledge or letter name knowledge not only as an index or predictor of literacy skills, but also as a foundational piece of children's literacy development (Foulin, 2005). While many are willing to concede that letter names do not directly intervene, they do emphasize the indirect influences on early literacy skills. Specifically, letter name knowledge appears to encourage the development of letter-sound knowledge and phonemic sensitivity or awareness, which in turn impact children's reading and spelling abilities (Foulin, 2005).

Individual Differences and Demographic Variables

While there are relatively few studies investigating individual and demographic differences affecting letter and alphabet knowledge specifically, there is a significant amount of research regarding demographic variables and individual differences that impact children's early cognitive, as well as language and literacy skill development. Early childhood is seen as a critical period for the development of key skills which do appear to be influenced by child, family, and environmental characteristics (Downer & Pianta, 2006). In terms of reading and later academic achievement, a number of risk factors have been repeatedly identified that significantly impact a child's developmental trajectory. Children who are particularly at risk for reading failure include those with disabilities, those who have a parent with a history of a reading disability, children who live in poverty, those who speak a language or dialect other than English, as well as children living in a household with few oral and written language experiences

(e.g. Justice & Pullen, 2003; Missall et al., 2007; Walker, Greenwood, Hart, & Carta, 1994). In their study of over 800 children, Downer and Pianta (2006) found significant relationships between child gender, race or ethnicity, maternal education, maternal sensitivity, and home learning environment with first grade achievement, supporting an ecological-transactional model of children's academic and cognitive development.

Individual Factors. In terms of gender differences related to children's cognitive and academic development, the research is mixed. While Downer and Pianta (2006) found that boys performed significantly better than girls in mathematics, auditory processing, verbal comprehension, and long-term retrieval, Denton and West (2002) found no significant gender differences in children's early development and achievement. Alternatively, Justice and colleagues (2005) found that preschool girls performed statistically significantly better than boys on early literacy tasks, including alphabet knowledge, print knowledge, concept of word, and beginning sounds. Looking specifically at letter knowledge, Iversen, Silberberg, and Silberberg (1970) had similar results, finding that kindergarten girls knew more letter names than boys. However, a study by Worden and Boettcher (1990) did not find any statistically significant gender differences across a number of alphabet knowledge tasks, including letter naming, letter writing, and letter sound knowledge. According to a report by the U.S. Department of Education (2001), girls are slightly more advanced in terms of letter knowledge at kindergarten entry, with 70% of kindergarten girls knowing letters of the alphabet compared to 62% of kindergarten boys.

One area of relative consistency in the literature with regards to children's development and achievement is the role of age and maturation. Children tend to progress in a number of skills, including literacy and alphabet knowledge throughout early childhood (Dodd & Carr, 2003; Justice, Invernizzi, Gell, Sullivan, & Welsh, 2005; U.S. Department of Education, 2001;

Worden & Boettcher, 1990). Even within a fairly small age range, of less than a year, older children are more able to identify letters of the alphabet, as well as make connections between printed letters and words with sounds (U.S. Department of Education, 2001). Worden and Boettcher's (1990) study illustrates that children gradually accumulate early literacy and alphabet knowledge skills throughout early childhood.

Another area of considerable debate regarding factors that impact children's development and learning is the relative contribution of genetics compared to environmental influences. Some researchers have estimated that approximately 50% of the variation in intelligence among children is due to genetic factors, while others estimate that after controlling for socioeconomic and environmental factors, the specific contribution of heritability on intelligence is rather small, somewhere between 1% to 10% (Gorey, 2001). Furthermore, in his review of existing research, Gorey reported a wide range of estimates as to the malleability of intelligence, or the extent to which IQ can be influenced by the home and other environmental factors, ranging from changes of 0 to 25 IQ points.

In terms of genetic contributions specific to early literacy and reading, research by Lyytinen and colleagues (2004, 2006) in Finland, have suggested stronger genetic associations than once thought. In studying infants and children with and without risk for dyslexia, the researchers found relationships between infant interest in shared-reading at 14 months and global language development and letter knowledge at 3.5 years of age (Laakso, Poikkeus, Eklund, & Lyytinen 2004). While acknowledging the possibility of a reciprocal relationship in terms of children's interest and skills in relation to how much parents read to them, they speculate that for some children, particularly those at risk for reading difficulties, core deficits related to reading and phonological processing may be strongly linked to genetic vulnerabilities (Laakso, et al.,

2004; Lyytinen, Erskine, Tolvanen, Torppa, Poikkeus, Lyytinen, 2006). These possible core deficits present at such a young age, may interfere with the development of interest in reading activities and therefore alter the trajectory of growth in terms of language and literacy development.

Regardless of individual factors such as gender and genetics, alphabet knowledge has consistently been shown to be one of the strongest predictors of later reading ability, better than prediction based on IQ as well as after controlling for IQ (National Institute for Literacy, 2008; Silberberg, Iversen, & Silberberg, 1968; Snow et al., 1998). Furthermore, research has consistently indicated that both cognitive and academic development are impacted by a number of environmental factors including familial, educational, social, economic, political, and physical influences which will be explored more deeply in the sections that follow (e.g. Downer & Pianta, 2006; Gorey, 2001).

Environmental Factors. As has been stated, there are specific groups of children who have been repeatedly shown to be at risk in terms of reading ability and later academic success. These groups include children from households of poverty and from less stimulating home environments, those with limited English proficiency, and those from racial and ethnic minorities (e.g. Bradley & Corwyn, 2002; Hart & Risley, 1995). Additionally, several studies have indicated that differences in a child's literacy environment are related to their acquisition of alphabet and letter knowledge (Burgess, Hecht, & Lonigan, 2002; Scarborough & Dobrich, 1994).

According to Raz and Bryant (1990), socioeconomic status is one of the strongest predictors of performance differences in children at the beginning of first grade. Children from low-income homes enter school with lower levels of skills related to reading readiness, including

language ability, phonological sensitivity, and print knowledge, and continue to trail behind their peers throughout schooling (Arnold & Doctoroff, 2003; Massetti, 2009). Children from economically disadvantaged families experience more difficulties with learning to read and write because they enter school with lower knowledge of letters, fewer letter-identification skills, and less familiarity with words than children from higher income levels (Lonigan, Burgess, Anthony, & Barker, 1998; West et al., 2000). In a study comparing tuition-paying and income eligible children in the same preschool program, Molfese, Beswick, Molnar, and Jacobi-Vessels (2006) found that children from lower income homes scored lower on all of the early literacy tasks including letter-naming, word-reading, and writing. Similarly, in a study of over 200 low-income children in Head Start programs, Diamond and colleagues (2008) found that although the children made progress in terms of letter knowledge and surpassed Head Start expectations of knowing at least 10 letters of the alphabet prior to kindergarten entry, only 21% of their participants were able to correctly identify all capital letters in contrast to 65% of children nationwide who enter kindergarten knowing all the letters of the alphabet (Diamond et al., 2008; U.S. Department of Health and Human Services, 2000; West, Denton, & Reaney, 2000). These children are often reared in homes that fail to provide sufficient early literacy experiences and materials to promote literacy skills (Lonigan et al., 1998). According to Hart and Risley (1995), the relationship between low socioeconomic levels and reading achievement is likely mediated by language. In observing and coding interactions of families, they found significant differences in both the quantity and quality of language used among families from different socioeconomic levels (Hart & Risley, 1992, 1995). Other studies have replicated and expanded their work to report variations in exposure to language in both the home and school environments (Walker et al., 1994). Furthermore, this research has shown that these differences have a lasting impact in

terms of subsequent child language, IQ, and achievement. Walker and colleagues found that children's receptive and expressive language, verbal ability, and academic achievement were related to prior socioeconomic, language and cognitive factors assessed seven years prior. They concluded that socioeconomic related differences in parenting and language exposure may lead to differences in children's early language development as well as differences in later academic success, specifically in terms of reading and spelling achievement, suggesting lower developmental trajectories over time.

Another identified risk factor for young children is coming from a home or being raised by parents who speak a language other than English (Bradley & Corwyn, 2002; Downer & Pianta, 2006; Hart & Risley, 1995, Snow et al., 1998; U.S. Department of Education, 2001). These children are part of a group termed "English learners" or "English language learners" (ELLs), which refer to children whose first or home language is not English, including children whose initial exposure to English occurs in a preschool or school setting, as well as those with various levels of English proficiency (Rivera & Collum, 2006). For all children, the home language is the means by which they are socialized into their families and communities (California Department of Education, 2008). In most families, children are first introduced to language and literacy in the home language, and those experiences provide an important foundation for success in learning literacy in English (CDE, 2008). Regardless of which language or languages young children are exposed to at home, they have, at best, only partially mastered the language when they enter a preschool setting (Bialystok, 2001). ELLs, specifically students whose first language is Spanish, make up an increasingly large percentage of students in both schools and preschools in the U.S., representing approximately 34% of Head Start's national enrollment (Administration for Children, Youth, and Families, as cited in Farver,

Lonigan, & Eppe, 2009). As a result, learning to read in a language other than the child's home language is an increasingly common challenge for many children (Muter & Diethelm, 2001). Unfortunately ELLs tend to have poor literacy outcomes which may be related to deficits in early literacy skills (Farver et al., 2009). ELLs typically perform below their peers in academics particularly in reading (Snow, et al., 1998). Furthermore studies have shown that not only are these children entering school with lower reading skills, they also fail to catch up to their peers in reading even after years of schooling and instruction (Davison, Seo, Davenport, Butterbaugh, & Davison, 2004).

In terms of young ELLs's experiences and abilities with language and early literacy skills, it has been hypothesized that young children who have been exposed to two or more languages may have different phonological awareness profiles than monolingual or English-only children, mirroring the phonological units and salient features of their home language (Bruck & Genesee, 1995). Others have suggested that these young ELLs may have an increased sensitivity to the phonological units of words because they regularly attend to sounds and word parts in order to distinguish between languages (Campbell & Sais, 1995; Muter & Diethelm, 2001). In evaluating the differences in early language abilities of preschoolers whose first language was English compared to children whose first language was not English, Muter and Diethelm (2001) found that children whose first language was English had significantly higher scores on rhyming, vocabulary, and letter knowledge. However, they also found that, letter knowledge was a strong predictor of reading achievement a year later for both groups. They concluded that English language phonological screening instruments, including measures of letter knowledge, were effective predictors of later reading ability and therefore potential screening tools for at-risk poor readers among children whose first language is not English. Even after only minimal exposure

to English in an educational setting, letter knowledge assessments could be used as a reliable and valid means of identifying young children from a variety of language backgrounds who could be at-risk for reading failure (Muter & Diethelm, 2001).

Children from racial and ethnic minorities have also been shown to be at risk in regards to literacy and achievement outcomes. Downer and Pianta (2006) found that White children performed better than minority children in a number of areas including phoneme knowledge. Others have found differences in the performance of African American, Caucasian, and Hispanic children on early literacy tasks, including phonological awareness and written language (Justice et al., 2005). However, according to Hart and Risley (1995), racial/ethnic differences in development and achievement may be better understood by considering the impact of previously discussed factors, including poverty and language.

Early Childhood Care and Education

Socially and politically, there seems to be an intuitive belief that educational experiences in early childhood are beneficial, particularly for children, who for any number of social or economic reasons, are at a greater risk of experiencing learning difficulties (Gorey, 2001). Research supports this assumption regarding the positive role quality child care and educational opportunities can play in children's development. McCartney (1984) found that children's cognitive and language development were related to the specific types of linguistic and cognitive experiences they had in childcare. Similarly, research supported by the National Institute of Child Health and Human Development (NICHD) has found that early child care experiences, particularly high-quality care, appear to enhance children's development of language and academic skills prior to school entry even above and beyond the effects of the family environment (NICHD ECCRN & Duncan, 2003). Additionally, Downer and Pianta (2006)

found that child care quality is more important than hours spent in child care in terms of variance accounted for in children's cognitive and academic development. Quality early childhood programs can significantly reduce gaps for disadvantaged students, potentially altering lifetime trajectories of at-risk children (Perez-Johnson & Maynard, 2007). For example, comprehensive early child care interventions can have sustained effects into early adulthood, leading to positive academic achievement, as well as increased rates of employment (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002). Gorey's (2001) meta-analysis of the effectiveness of early childhood educational opportunities showed strong support for preventative value of early childhood interventions. Gorey also demonstrated a clear relationship between the intensity and duration of early childhood interventions and their effects, with more intensive preschool interventions having longer lasting effects than programs of moderate or low intensity. While participation in an intense, high quality early childhood program may benefit all children, the social benefit is greatest for children from poverty, as educational investments in early childhood can improve the productivity of later investments as well (Perez-Johnson & Maynard, 2007). Early, intensive intervention and instruction can help children from poverty enter kindergarten with skills comparable to their peers (Abbott, Atwater, Lee, & Edwards, 2011). Not only are there immediate benefits, but according to Perez-Johnson and Maynard (2007), there are also long-term benefits of participation in earl childhood programs, such as education and employment, that carry into adolescence and adulthood. The implications of these long-term benefits suggests that money spent in providing early childhood educational opportunities for children, helps not only the individual but society as a whole (Gorey, 2001; Perez-Johnson & Maynard, 2007).

Early Literacy Instruction

While the research has shown the need for intensive early childhood educational opportunities, the content and process of these programs is also important in terms of reaching desired outcomes. Approximately 40% of children enter kindergarten at least one year behind their peers in critical language and reading readiness skills, illustrating the need for programs that foster the early literacy development of at-risk children to ensure that they enter kindergarten with the skills necessary to become successful readers (Fielding, Kerr, & Rosier, 2007; Gettinger & Stoiber, 2007). It is increasingly recognized that the preschool period is an ideal opportunity to promote literacy development, as well as to screen and intervene for potential reading difficulties (Missall et al., 2007). Children define themselves as learners during the first few years at school, and do not come to kindergarten as blank slates, but with a wide range of differences in terms of their educational experiences and skills (Lyytinen et al., 2006; Missall et al., 2007). Children who experience failure during kindergarten and first grade may make unfavorable comparisons of themselves to others, having lasting effects on their learning and attempts at learning (Lyytinen et al., 2006; Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003).

In response, the National Association for the Education of Young Children has a current joint statement with the International Reading Association, endorsing appropriate literacy assessment and instructional strategies with the purpose of accelerating children's progress towards literacy (NAEYC & IRA, 2005). Current best practice regarding the content of early literacy instruction includes a combined focus on phonological awareness and alphabet knowledge (Justice, Chow, Capellini, Flanigan, & Colton, 2003). However, the variability in approaches to the implementation of phonological awareness and alphabet instruction suggests that current best practices primarily draw from common sense and precedence rather than

empirically-validated methods (Justice et al., 2006). Findings by Hammill (2004) indicate that if the goal of instruction is improvement in reading, instructional or intervention programs should emphasize print awareness and strategies such as alphabet knowledge, sound-letter correspondence, spelling, punctuation, oral and silent reading, as well as writing. A study by Connor, Morrison, and Slominski (2006) found that explicit, alphabetic code-focused activities along with rich, meaning-based experiences led to better student outcomes than a focus on one approach to the exclusion of the other. They further explain the importance of developmentally appropriate, explicit activities that include high levels of teacher-child interaction and engagement. However, they also caution that the most appropriate form of instruction is dependent upon the skills being taught as well as individual child factors; in short, there is no one size fits all approach.

Justice and colleagues have stated that high quality literacy instruction should include systematic and explicit instruction teaching children about the code-based features of language (Justice, Mashburn, Hamre, & Pianta, 2008). Justice further proposed three principles for early childhood instruction and intervention: 1) activities should address print and phonological awareness, 2) activities should include naturalistic opportunities for teaching and learning, as well as explicit instruction, and 3) the activities and practices should be evidence-based (Justice & Pullen, 2003). In a study designed to identify children who do not respond to typical early literacy intervention, Al Otaiba and Fuchs (2006) demonstrated that using a well-implemented, systematic, and explicit intervention that targeted both phonological and alphabetic awareness, supplemented by teacher-directed phonological awareness training, they were able to substantially reduce the numbers of children identified as at risk for reading problems. Similarly, child outcome data from the same ERF project as the present study, demonstrate that by

increasing the quality and duration of literacy instruction, teachers and staff were able to make significant gains in children's early literacy skills and preparedness for kindergarten (Abbott et al., 2011). Another key to effective programs, such as the one described by Al Otaiba and Fuchs, is the use of strategies that regularly assess children's progress and mastery in order to determine the level of need for individual children (Al Otaiba & Fuchs, 2006; Massetti, 2009). This is particularly important in light of additional work by Lyytinen and colleagues (2000) that suggests it is the trend of development rather than the level that is predictive of later reading ability. They found that children who began an early childhood program with relatively high abilities, but had a declining trend, were among the poorest readers.

In addition to the content of early literacy instruction, classroom and instructional quality also play an important role in impacting children's development and learning. According to Domínguez and colleagues, classroom quality accounts for approximately 27% of the variance associated with changes in learning behavior and learning outcomes (Domínguez, Vitiello, Maier, & Greenfield, 2010). By some accounts, instructional quality or classroom quality is the single most important factor that influences achievement (Justice et al., 2008; Nye, Konstantopoulos, & Hedges, 2004). The concept of quality in terms of early literacy instruction is multidimensional and dynamic incorporating structural features, such as teacher-child ratio and curriculum materials, as well as process features, such as teaching behaviors, teacher warmth and sensitivity, and the provision of developmentally appropriate activities (Domínguez et al., 2010; Justice et al., 2008; NICHD ECCRN, 2000). However, a significant limitation on current research of quality early childhood instructional practices and settings is a lack of validated tools that adequately assess both structural and procedural components of quality literacy and language instruction (Justice et al., 2008). Additionally there is a need for further research

integrating the findings from the early literacy literature into typical early childhood classrooms and settings using the resources and personnel that are sustainable and readily available (Massetti, 2009).

Tiered Instruction

One method for providing quality individualized instruction to children is through the implementation of a Response to Intervention (RTI) or tiered instructional model. RTI models have become more prominent in academic settings following the implementation of IDEIA (2004), which allowed schools to use an RTI model to identify students with learning disabilities, as well to provide early intervention to at-risk students. Inherent in a RTI approach is the practice of providing high-quality instruction and individualized intervention based on children's needs (Fuchs & Fuchs, 2006; Gettinger & Stoiber, 2007). Therefore, one of the key components of an RTI framework is a focus on prevention, research-based intervention, and data-based decision making, which is clearly aligned with the goals in early childhood education and intervention (Gettinger & Stoiber, 2007). However, until recently, RTI models have not been widely implemented or documented in early education contexts (VanDerHeyden & Snyder, 2006). Most applications of RTI within early childhood or early intervention settings have focused on challenging behaviors rather than academic and cognitive development (Gettinger & Stoiber, 2007). Alternatively, in many elementary and secondary school settings, most educators look to RTI as a means of delivering early intervention to address academic problems (Fuchs & Fuchs, 2006).

RTI is a multitiered instructional approach, with different RTI models utilizing two to four tiers (Fuchs & Fuchs, 2006). The intervention and instruction provided becomes more intensive as a student moves across tiers. However, the successful implementation of a RTI

model hinges on the use of a systematic screening and progress monitoring system that allows teachers to provide targeted and individualized instruction (Gettinger & Stoiber, 2007). Within the model, a subgroup of at-risk students is identified from a population (Fuchs & Fuchs, 2006). Their response to the general education or universal instruction is monitored. Appropriate progress monitoring measures are used to allow teachers to determine whether changes need to be made to the curricula or procedures based on student response and progress. Students who are not making adequate progress receive more individualized and intensive support. Within a RTI framework increasing the intensity of instruction is achieved by using more systematic and explicit instruction, increasing the frequency of instruction, adding to its duration, creating smaller groups, or by relying on instructors with greater expertise (Fuchs & Fuchs, 2006). According to Fuchs and Fuchs, RTI serves two primary purposes: to provide struggling students with early and effective instruction and to provide a valid means of assessing learner needs.

In the context of early childhood and specifically early literacy, multi-level models have been introduced to address the needs of children who do not respond to the early literacy curriculum presented to all children (Al Otiba & Fuchs, 2006). According to Al Otiba and Fuchs, a RTI framework in early literacy is necessary to allow for more intensive instruction to be delivered to the nonresponders, or students who fail to make adequate progress in response to more intensive intervention, and further, to provide intensive instruction tailored to the children's strengths and weaknesses.

Fidelity

A key component and important methodological concern in the research and practice of both early childhood and RTI initiatives is the concept of fidelity or treatment integrity (Griffiths, Parson, Burns, VanDerHeyden, & Tilly, 2007; Hagermoser Sanetti & Kratchowill,

2009). In simplistic terms, fidelity, which has also been called treatment integrity, intervention integrity, or procedural reliability, is the degree to which a curriculum or intervention was implemented as planned (Hagermoser Sanetti & Kratchowill, 2009). However, conceptualizations and models of treatment fidelity from education and related fields indicate the complexity of the construct as it is impacted by a number of variables. In their review of relevant literature, Hagermoser Sanetti and Kratchowill identified over 300 variables that might influence treatment fidelity, which they roughly categorized into four groups: external environment, organization, intervention, and interventionist. In reviewing at least six different models conceptualizing fidelity, they found several areas of commonality, including factors related to the content or what intervention and intervention steps were delivered, quality (how well the intervention steps were delivered), quantity, (how much of the intervention was provided), and process, (how the intervention was delivered). However, despite some areas of overlap, they suggest that "we are still a long way from consensus on a definition of treatment integrity" (p. 446).

While there is no agreed upon definition of fidelity, there is agreement regarding its importance to the field (Greenwood, 2009; Gresham, 2009; Hagermoser Sanetti & Kratchowill, 2009) as it is by understanding and measuring fidelity and integrity that science is able to empirically demonstrate that measurable change in a dependent variable is due to the manipulation of one or more independent variables (Gresham, 2009). According to Greenwood (2009), "treatment integrity is the key to wide-scale application of evidence-based practices and to reaching a discipline of greater effectiveness" (p. 548). Fidelity data are essential as a quality-control tool in the transfer of evidence-based practices from research to practice in the field. While outcome measures have been used to assess the effectiveness of a practice or program,

they do not capture all of the necessary information regarding its implementation, and are at best, imperfect measures of implementation with only modest correlations between outcomes and fidelity (McHugo et al., 2007). However, according to Gresham (1989, 2009), fidelity is not often assessed or reported in the literature and many times fidelity is "assumed rather than assessed and empirically demonstrated" (Gresham 1989, p. 47). One possible reason for the lack of assessment is the lack of fidelity and treatment integrity measures with adequate psychometric properties (Hagermoser Sanetti & Kratchowill, 2009). Many that are developed and used are intervention specific with limited generalizability. Another difficulty in measuring and reporting fidelity is that there is no database with reliable information to guide decisions regarding optimal levels (Gresham, 2009). According to McHugo's (2007) report on multiple fidelity practices, many use 5-point Likert-type scales, with a four or higher indicating high fidelity, a three to four representing moderate fidelity, and less than a three suggesting low fidelity. However, there is no consensus on appropriate cut-off scores used to designate high fidelity, for the purposes of quality, implementation, or accreditation (McHugo et al., 2007).

In educational research, the implementation of manualized curricula or interventions are beginning to more regularly include measures of procedural fidelity to ensure they are implemented as intended (Justice et al., 2008). Procedural fidelity measures assess whether a teacher or interventionist follows the step-by-step process regarding the implementation of an approach. The inclusion of procedural fidelity measures is considered to be an essential component of intervention research (Gersten, Fuchs, Compton, Coyne, Greenwood, & Innocenti, 2005). However, procedural fidelity must be distinguished from quality of implementation, which is much harder to conceptualize and measure. Quality of implementation or quality of instruction refers to the teacher's ability to respond to the individual strengths and needs of

children in the delivery of a curriculum or program, while maintaining the key components (Justice et al., 2008). Overall, research has suggested that higher levels of treatment integrity and fidelity result in better outcomes (e.g. O'Donnell, 2008), however it is not always so simple (Hagermoser Sanetti & Kratchowill, 2009; Justice et al., 2008; Noell, 2008). For example, Justice and colleagues (2008) found that although teachers were able to implement a scientifically-based language and literacy instruction program within their classrooms, higher levels of procedural fidelity did not necessarily lead to high quality instruction. Further, fidelity to specific implementation routines had no predictive value in terms of instructional quality. However, fidelity to specific teaching aspects of the program was a positive predictor of the quality of literacy instruction (Justice et al., 2008). They suggest that broad measurements of procedural fidelity provide little information regarding the quality of instruction in the classroom. Additionally, it is possible that relationships between measures of procedural fidelity and quality or between procedural fidelity and outcomes are not clear because all components of an intervention or curriculum may not be equally important in its effectiveness (Hagermoser Sanetti & Kratchowill, 2009; Schulte, Easton, & Parker, 2009) There may also be a ceiling effect in terms of treatment integrity above which improvements may not be necessary or beneficial (Gresham, 2009; Hagermoser Sanetti & Kratchowill, 2009; Schulte et al., 2009).

Current Study

It is clear that there is an abundance of research illustrating the predictive value of alphabet and letter knowledge as an indicator of later reading abilities (de Jong & Olson, 2004; National Institute for Literacy, 2008; Snow et al., 1998). However, there are still a number of questions and holes in the literature relating to the specific impact of letter knowledge as well as the actual acquisition of letter knowledge. Additionally, it is clear that there are a number of

factors that impact children's development and learning, ranging from individual and genetic factors (e.g. Downer & Pianta, 2006; Gorey, 2001), to the role of the environment in which they are raised (e.g. Bradley & Corwyn, 2002; Downer & Pianta, 2006; Hart & Risley, 1995), as well as specific features and characteristics of the early literacy instruction they receive (e.g. Al Otiba & Fuchs, 2006; Justice et al., 2008). Again, questions remain regarding the specific roles these factors play, as well as how to best remediate known risk factors in the hopes of improving educational outcomes for all children.

The current study seeks to add to the presented body of knowledge by evaluating differences in children's letter knowledge and letter knowledge acquisition across an academic year and by investigating the effects of varying levels of fidelity and quality of instruction to further explain children's progress.

CHAPTER III

METHODS

This chapter will include an overview of the Wyandotte County Early Reading First (Wy-ERF) project and will describe the methods of the current study including the participants, instruments, and procedures used as well as the methods for analyses. Archival data from the Wy-ERF project will be used.

Wy-ERF

Overview of Program

The Wy-ERF project was a partnership between Juniper Gardens Children's Project (JGCP) at the University of Kansas and several community organizations and preschools in the Kansas City, KS area. The project was an ERF project funded through the U.S. Department of Education (2007-2010). ERF programs are designed to prepare young children who are at risk to enter kindergarten with the language, cognitive, and early reading skills needed to prevent early reading difficulties and to ensure school success. Wy-ERF sought to achieve this goal by providing support and professional development (PD) for teachers to encourage the implementation of evidenced-based practices to provide effective general and more intensive differentiated early literacy instruction dependent on child need.

Wy-ERF used a tiered prevention model to provide classroom or universal instruction (Tier-1) as well as intervention (Tier-2). Teachers' implementation of the tiered model was supported by a results-based language and literacy PD model which included in-service training and ongoing coaching that focused on instructional support and teacher planning. Wy-ERF used standardized pre-post assessments as well as ongoing progress monitoring to identify children in need of more intensive instruction. Children who scored a standard score of 90 or below on the

Test of Preschool Early Literacy (*TOPEL*; Lonigan, Wagner, & Torgesen, 2007) were identified to receive additional Tier-2 small group skill-based intervention based on formative progress monitoring data collected at least once per month.

With the increased levels of teacher knowledge and support provided to the preschool centers, Wy-ERF aimed to create ERF preschool centers of educational excellence. A Wy-ERF goal was to increase the intensity of scientific research-based language and literacy instruction for preschoolers in the Kansas City area who are at risk (Abbott, 2007).

Participating Sites, Teachers, and Children

Wy-ERF consisted of nine classrooms annually, housed in four center-based, early childhood programs that serve low income families in Wyandotte County, Kansas. The participating classrooms provide full-day programming for children ranging in age from three to five years old. In three of the four centers, children of different ages were distributed across classrooms. In the fourth center, children were placed in their classrooms based on age, resulting in three separate classrooms for three, four, and five year olds, respectively. The children were assigned to their classrooms by the site administrators, independent of Wy-ERF. Classrooms were staffed by two or three teachers, maintaining a 6-to-1 student-to-teacher ratio. The teachers were also assigned to their classrooms by site administrators, but all indicated their willingness to participate in the project by signing an agreement. This agreement clearly stated teacher responsibilities for project participation. The teachers received ongoing support from a Tier-1 mentor coach. Each Tier-1 coach was responsible for three classrooms. Additionally, Tier-2 intervention coaches worked with the mentor coaches and teachers to plan, model, and implement more intensive small group interventions for identified children.

Program Goals and Components

There were five specific goals of Wy-ERF that guided the development and implementation of the program (Abbott, 2007). These goals were:

1. To integrate research-based instructional materials and literacy activities into existing programs of collaborating preschool and Head Start centers.
2. To increase the use of evidence-based instructional strategies and activities for enhancing oral language, phonological awareness, print awareness, and alphabet knowledge.
3. To raise the level of environmental support for language and early literacy development in cooperating ERF preschool centers.
4. To provide and support professional development based on scientifically-based reading research to enhance preschoolers' language, literacy, and pre-reading development.
5. To increase the use of screening and progress monitoring reading assessments in order to effectively identify children at risk for reading failure and lead to improved instruction for individual children.

Tiered Instruction and Intervention

In order to choose a curriculum to facilitate Tier-1 instruction, JGCP created a selection rubric to guide the process. The rubric included evidenced-based, inclusion of a scope and sequence with teacher lesson plans, alignment with local K-3 curriculum, provisions for adaptations for diverse learners, and a parent component. A committee comprised of partners and stakeholders in the project including local school district and preschool teachers reviewed the curricula and selected the Scholastic Early Childhood Program (SECP; Block, Canizares, Church, & Lobo, 2003). SECP is a research-based curriculum designed specifically for preschooler's language/literacy skills development. Effectiveness studies of SECP's use include

empirical methods and rigorous analyses and these studies have appeared in peer-reviewed journals (Hayes, Maddahian, & Fernandez, 2002; Snyder, 2003). The design of the SECP curriculum allows for both teacher-initiated or direct instruction as well as child-initiated explorations. The curriculum promotes class discussions, provides many books and other materials for print and non-print experiences related to language and literacy development, and includes a number of oral language, phonological awareness, print awareness, and alphabetic knowledge activities. The curriculum also provides materials in English and Spanish and includes an "ESL Bridge" with each circle and storybook reading activity that provides differentiated alternatives that can be used for children from diverse language backgrounds as well as those who are below average in the language and literacy development (Block et al., 2003).

Teachers were provided with training and on-going support regarding the implementation of the SECP curriculum through PD in-service trainings as well as weekly meetings with mentor coaches. In addition, Wy-ERF provided a number of environmental supports, including supplementary materials to enhance the physical classroom environment to maximize children's development through the incorporation of print-rich materials and activities throughout the classroom. Wy-ERF teachers and staff worked together to identify strengths and weaknesses in the implementation of Tier 1 or universal instruction through regular fidelity of implementation checks and regular observations and feedback from Tier-1 coaches in order to address areas in need of improvement.

Throughout their training, teachers were encouraged to work together as a team. Rather than more traditional models with 'lead' and 'assistant' teachers, Wy-ERF teachers were all held responsible for the planning and implementation of curriculum and Wy-ERF expectations in the

classroom. All of the teachers received the same training regarding early literacy skills and strategies for skill development and were expected to utilize that knowledge in the delivery of literacy instruction throughout the academic day.

When classroom teachers demonstrated proficiency in the implementation of Tier-1 curriculum (a minimum of 80% on Tier-1 Fidelity of Implementation checklists; see Appendix D), they received additional training regarding the implementation of Tier-2 instruction and intervention. As defined by the Wy-ERF project, Tier-2 instruction had three major components to consider: 1) the methodology used to increase the intensity of instruction, 2) the skill or content to be delivered, and 3) the specific intervention to be used (Abbott, 2008). Three different methods were presented as options to increase the intensity of instruction. The first was to provide a "double dose" or to repeat a lesson that had previously been taught. The second method was to decrease the size of the group, either to an individual intervention or a smaller group of 3 to 4 children. This allowed the teacher to provide more individualized and scaffolded instruction. The final method for increasing the intensity of instruction was to narrow the skill set or content of the instruction. For example, the teachers might focus on a pre-skill such as identifying beginning, middle, and end before practicing initial sounds. The most effective method for instruction and intervention was dependent upon the number of children needing Tier-2 intervention, the staff availability to provide Tier-2 instruction, and the level of intervention needed. The second component for consideration as part of Tier 2 was determining the skill or content to be delivered. This decision was guided by progress monitoring data indicating the progress children were making in terms of letter knowledge, phonological awareness, and oral language development. The final component for Tier 2 implementation was choosing the intervention to be used. Wy-ERF staff compiled a list of intervention strategies that

could be implemented within the classrooms and aligned with the previous two components. Intervention coaches worked with classroom teachers to consider progress monitoring data to determine the methodology, skill, and intervention to be implemented. In addition, Tier-2 intervention coaches modeled and monitored the implementation of the intervention and met with teachers to monitor the child's response to the intervention. Tier-2 interventions were designed to be as multisensory and concrete as possible to encourage a child's active involvement. It should also be noted that Tier-2 was an additional amount of time in literacy instruction, not a replacement for the child's participation in daily routines and activities.

Assessment and Progress Monitoring

One of the key components of an effective tiered model of classroom instruction and intervention is the frequent monitoring of children's progress and the use of that information to make data-based decisions regarding instructional needs (Fuchs & Fuchs, 2006). Wy-ERF used both formative and summative assessments of children's language and literacy development. These assessments were used to guide decision-making in terms of the instructional needs of individual children as well as to provide direction for future PD topics for teachers' training. Specifically, children designated as below average on the TOPEL were assessed monthly on progress monitoring measures. These measures assessed children's knowledge and growth in the areas of alphabet letter-name and sound knowledge, initial sound identification, word segmentation, oral language fluency, and letter-name fluency. Based on children's progress, decisions were made regarding instructional grouping and content. On a broader level, Wy-ERF project staff was also able to use the data from child assessments to determine areas of need across sites and classrooms. For example, if word-part or word segmentation was observed to be

a weakness in most classrooms, additional strategies for teaching and practicing these skills at differentiated levels could be incorporated into PD opportunities for the teachers.

Assessments were conducted by an assessment team. Each member of the assessment team was trained on all of the measures and became reliable at or above 90% in terms of inter-rater reliability. As part of Tier 2 implementation, classroom teachers and mentor coaches were trained by members of the assessment team to administer the progress monitoring measures.

Professional Development

In terms of desired outcomes for children, the success of the Wy-ERF project was dependent upon the teachers' effective implementation of evidenced-based instructional strategies. Therefore, a significant amount of time and energy was devoted to not only improving teachers' understanding of language and literacy development but also to teacher-use of evidence-based practices through two types of professional development activities. First, Wy-ERF teachers participated in a minimum of 52 hours of formal in-service training per year (provided by project staff). The primary goals of the in-service training were to improve teachers' knowledge and skills and to equip them to put into action strategies for enhancing the language and literacy development of at-risk preschoolers. This included implementing evidenced-based strategies and instruction, providing a quality literacy environment, and using data to inform practice (Abbott, 2007). To do so, teachers received training on a variety of concepts and skills including structural aspects of instruction, such as implementation of the SECP curriculum, establishing routines and procedures, as well as the expectations of the project as defined by the Fidelity of Implementation checklists. Teachers were also trained regarding improving the quality of instruction to provide more opportunities for children to respond, increasing conversations in the classroom, and identifying and utilizing teachable moments.

Teachers learned strategies and steps for providing scaffolded instruction throughout the day, including modeling skills and behavior, providing guided practice and independent practice. The in-service sessions were designed to be both didactic and interactive in terms of presenting relevant information and then giving teachers an opportunity to integrate and reflect on the information as it related to their experiences and classroom.

The second type of PD involved ongoing, on-site coaching. The Tier-1 coaches were all highly qualified with a Master's Degree in Early Childhood as well as training and experience as a coach. They provided approximately four hours of coaching support a week for each of their assigned classrooms. The classroom teachers met weekly with their Tier-1 coach to plan for the next week's lessons and activities and to reflect and review the previous week's implementation. The Tier-1 coaches also provided long term implementation support for the strategies and skills learned in in-service trainings. Tier-1 coaches were able to model and provide structured support in the classroom for quality Tier-1 instruction. For example, Tier-1 coaches worked with the teachers to plan and implement effective, differentiated small group lessons or ideas to facilitate purposeful center time engagement.

Throughout the course of the project, the content and structure of PD trainings were also driven by data-based decisions. Project staff considered child assessment data, fidelity of implementation checklists, coach observations and reports, as well as teacher feedback and evaluation to plan future training opportunities to best meet the needs of Wy-ERF teachers and children.

In summary, Wy-ERF was a collaborative effort of JGCP, community organizations, and preschools designed to increase the quality and intensity of literacy instruction to better prepare preschoolers who are at risk for later academic achievement. Through the implementation of a

tiered instructional model in the classroom supported by a results-based PD model, Wy-ERF equipped teachers to use evidenced-based strategies to identify and meet children's needs in terms of their language and literacy development.

Method

Participants

The sample for the study consisted of 201 children who were enrolled in nine preschool classrooms participating in the Wy-ERF project during the 2008-2009 (n=80) and 2009-2010 (n=121) school years. Of those, 24 withdrew from their respective schools throughout the school year and therefore will not be included in the analyses due to incomplete data. The final sample included 177 participants, 80 (45%) males and 97 (55%) females, with an average age of 46.3 months (range= 29-60 months, *SD*= 7.01) as of September 1 of the first year of the child's participation in the program. The academic years included in the study are the second and third years of the Wy-ERF project. Children who participated in the program in its first year (2007-2008) are not included in this sample. Similarly, children who participated in the first year and returned to the program for the second year were not included. Only children who were in their first year of participation in the Wy-ERF project were included. The racial/ethnic composition of the participants was 44% African American, 25% Hispanic, 3% Caucasian, 1% Native American, 5% with dual or mixed racial backgrounds, and 22% with missing information.

All parents consented to their child's literacy skills being assessed, including alphabet knowledge. Children whose parents did not consent were still able to fully participate in classroom activities; however, their information is not included for research purposes. Assessments from only the first year were included for children who were enrolled in the classrooms for both school years. Approval for the study was obtained from the Human Subjects

Committee-Lawrence (HSC-L), at the University of Kansas for the Wy-ERF program (see Appendix A). Permission to use the data collected by the program was obtained from the principal investigators of the project.

A total of 32 teachers participated in Wy-ERF during the two years included in the present study, with eight new teachers joining the project during the second year. The teachers included 31 (97%) females and 1 (3%) male with varied levels of professional experience and training ranging from CDA (Child Development Associate) certification to associate and bachelor degrees. For example, some of the teachers had been in their current field and placement for several years, while others were new to the field. Six of the teachers were proficient in Spanish. Additional demographic information concerning the teachers was not collected.

Table 1

Distribution of Children and Staff in Participating Classrooms

Classrooms	2008-2009	2009-2010
1	n=11; R2, R2, N*	n=15; R3, R3, R3
2	n=9; R2, R2, R2	n=14; R3, N, N
3	n=11; R2, R2, R2	n=14; R3, R2, N
4	n=8; R2, R2, R2	n=14; R3, R3, N
5	n=12; R2, R2, R2	n=10; R3, R3, R3
6	n=10; R2, R2, R2	n=11; R3, R3, R3
7	n=1; R2, R2*	n=10; R3, R3, N*
8	n=3; R2, R2*	n=9; R3, R3, N*
9	n=4; R2, R2*	n=11; R3, N, N*

Note. R= Returning Teacher (# indicates year); N = New Teacher; * Staffing changed during the year

The distribution of children and staff across the participating classrooms is presented in Table 1. Classroom teachers' experience in the Wy-ERF project is also presented in Table 1.

Classroom numbers are not consistent across project years meaning that Classroom 1 from 2008-2009 is not necessarily the same as Classroom 1 from 2009-2010. Similarly, the specific teachers and teaching groups assigned to the classrooms changed from one year to the next, so the teachers included in Classroom 1, 2008-2009 are not the same teachers as Classroom 1, 2009-2010.

Instruments

A number of assessment instruments were used as part of the Wy-ERF project and are relevant to the current study. Child assessment measures included the TOPEL and the Phonological Awareness Literacy Screening-Pre K (PALS-Pre K; Invernizzi, Sullivan, Meir, & Swank, 2004a) Alphabet Recognition subtest. Additionally, parents of participating children were asked to complete a demographic survey. Finally, the quality of classroom instruction was assessed using a Fidelity of Implementation measure created by project staff for the Wy-ERF project.

Test of Preschool Early Literacy. The TOPEL is a standardized test of early literacy skills, consisting of three subtests: Print Knowledge, Definitional Vocabulary, and Phonological Awareness (Lonigan, Wagner, & Torgesen, 2007). Each subtest results in a standard score. Additionally, all three subtests are considered when calculating a composite score or Early Literacy Index that is an overall indicator of the child's early literacy skills. The subtests were administered individually by a trained assessor either in one session, or split into two sessions based on the child's ability to attend. The Print Knowledge subtest assesses children's knowledge of writing conventions as well as alphabet knowledge. The child is asked to identify letters and words among symbols and pictures and to identify and name specific letters. The Definitional Vocabulary subtest asks the child to verbally identify a picture and then answer a

question related to the picture. The Phonological Awareness subtest consists of multiple parts which assess the child's ability to segment and blend words and word parts. According to the manual, the scores of the three TOPEL subtests have strong to very strong internal consistency reliability (*rs* = .87- .95) and strong test score stability over a 2-week test-retest interval (*rs* = .81 to .89; Lonigan, Wagner, Torgeson &Rashotte, 2007). In terms of validity, TOPEL Early Literacy Index scores correlated with the reading quotient of the Test of Early Reading Ability-Third Edition (TERA-3; Reid, Hresko, & Hammill, 2001) and the Get Ready to Read! Screening Tool (National Center for Learning Disabilities, 2001), with correlations of .63 and .60, respectively. In addition, subtest scores from the TOPEL were correlated with the scores of the Expressive One-Word Picture Vocabulary Test-2000 Edition (EOWPVT; Gardner, & Brownell, 2000), TERA-3, and the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999). Specifically, the Print Knowledge subtest scores correlated .74 with scores on the TERA-3 Alphabet subtest, the Definitional Vocabulary subtest scores correlated .62 with EOWPVT scores, and the Phonological Awareness subtest scores correlated with the Elision and Blending of Words subtest scores of the CTOPP, .52 and .55, respectively.

Phonological Awareness Literacy Screening-Pre K: All of the children in the study were assessed with the PALS-Pre K Alphabet Recognition subtest (see Appendix C). The subtest consists of three parts and assesses children's letter name and sound knowledge. The current study included only the first part- uppercase letter name knowledge. The PALS-Pre K was created as a downward extension of kindergarten and early elementary assessments. Pilot testing as well as existing research indicated the importance of alphabet knowledge as a measure of early literacy (Invernizzi, Sullivan, Meir, & Swank, 2004b). The assessments were administered individually by a trained assessor. The child was presented with an 8 ½ x 11 sheet

of paper with all 26 uppercase letters printed in large font in rows. The letters were presented in random order, but held constant across all participants and time. Technical information available on the PALS-Pre K Alphabet Recognition subtest revealed high levels of inter-rater reliability (*r* = .99) in the administration and scoring of the subtest (Invernizzi et al., 2004b). Additional technical information regarding validity was investigated considering the PALS-Pre K as a whole, which includes subtests assessing beginning sound, rhyme awareness, print awareness, and name writing. These studies provide evidence for the construct validity of the PALS-Pre-K scores. The PALS-Pre-K scores measure a unitary trait, "emergent literacy" (Invernizzi et al., 2004b, p. 59). Concurrent validity was demonstrated with the scores of other reading assessments, including moderate to strong correlations with scores of the TERA-3 (*r*=.67), Child Observation Record (High/Scope Educational Research Foundation, 1992; *r*=.71), and the Test of Awareness of Language Segments (Sawyer, 1987; *r*=.41). Predictive validity was also evaluated and showed moderate and significant relationships with scores from subsequent administrations of the PALS- K (*r*=.53) and the PALS 1-3 (*r*=.56; Invernizzi et al., 2004b).

Family Survey/Home Language Survey: The Family Survey/Home Language Survey is a tool created by the Wy-ERF project that was completed by each child's parent or guardian at the beginning of the school year (see Appendix B). The survey asked the parent to identify the child's gender, birth date, and ethnicity. Parents also identified their child's home or first language as English, Spanish or other. For the students and families participating in Wy-ERF, children whose home language was not English were identified as ELLs. Furthermore, all of the ELLs participating in the Wy-ERF program came from Spanish-speaking backgrounds and homes.

Classroom Fidelities: The quality of classroom instruction was assessed using the Fidelity of Implementation measures created by project staff for the Wy-ERF project (see Appendix D). The fidelities were designed to measure the implementation of project goals, specifically teaching literacy throughout the day. Fidelity of Implementation measures included a checklist for Circle Time, Center Time, Story Time, and Small Group. Each checklist includes elements of quality instruction relevant to the time of day and can be scored as a 0, 1, or 2. The scores are defined as follows: 0 (*does not do*), 1(*does on a limited basis*), and 2 (*fully implements*). The checklists include 9 to 12 items regarding the planning and implementation of the lesson and activities for the specific time of day, including aspects of procedures as well as the quality of the teachers' instruction and interactions with children. Each fidelity or checklist was scored as a percentage and then a combined percentage was calculated for all parts of the day. Fidelities were administered a minimum of two times per year per classroom, in the fall and spring. Fidelities were conducted by a team of assessors, with annual reliability checks. In most cases, all of the fidelity checklists were completed in one day, with the assessor observing all morning during instructional time. The assessor took narrative notes throughout the observation and then completed the related fidelity checklists. Each teacher's performance and interactions with the students were considered separately across each item. Each item is scored individually, meaning a teacher could do very well on some portions of a checklist, but not all. However, due to the teachers' shared responsibility for instruction in the classroom, fidelity scores of the teachers in a classroom were combined together and these scores represented the overall quality of instruction received by children in the classroom.

As was previously mentioned, procedural fidelity and quality of implementation are two related, but different concepts. While the checklists described were called fidelities by the Wy-

ERF project, they are more accurately understood as measures of implementation of teacher quality of evidenced-based direct instructional strategies. For example, teachers were rated on their use of modeling, guided practice with students, and students' opportunities for independent practice. The fidelities were designed to identify and measure teachers' strengths and weaknesses on these instructional strategies within the context of implementation of an early literacy curriculum according to the goals and key components of the Wy-ERF project. The fidelity checklists do assess procedural fidelity in terms of the specific components included during each segment of the day, but also assess the quality of their implementation or how well each component is implemented.

Procedures

As was previously described, Wy-ERF was designed and implemented to improve early literacy and language skills of preschoolers who are at risk by providing intensive training and coaching support to early childhood teachers to help the teachers implement quality literacy instruction throughout the school day.

In order to monitor the implementation of the project and track children's progress, classroom and student assessments were conducted frequently as described below. Classroom assessments primarily consisted of formal and informal observation tools used to identify strengths and weaknesses in the implementation of Wy-ERF strategies and goals, including the Fidelity of Implementation measure which was administered at least two times per year per classroom. Similarly, child assessments were conducted to identify students' strengths and weaknesses as well as to track student progress. Each child was assessed with standardized measures, including the TOPEL at the beginning and end of each school year. In addition, children were assessed with progress monitoring measures a minimum of three times a year: at

the beginning of the school year, following winter break, and at the end of the school year. The progress monitoring measures included the PALS-PreK. All of the assessments were individually administered by a team of trained assessors according to the standardized test administration procedures for each measure. Bilingual assessors worked with children identified as ELLs based on the information provided on the Family/Home Language Survey. Based on the child's language abilities, directions were given in either language. Similarly, for ELLs, responses in either English or Spanish were considered and were marked correct or incorrect. For children (n= 51) who required the assessment to be conducted in Spanish, the final subtest of the TOPEL could not be administered. The tasks, blending and segmenting of words, do not translate, as the Spanish and English version of a given word may include a different number of syllables and different sounds.

Children were identified as being "At-Benchmark" or "Below-Benchmark" based on their TOPEL performance at the beginning of the year. Children whose Early Literacy Index score was within or above the average range, a standard score at or above 90, were considered "At Benchmark" as they were performing at or above a level that would be expected for their age. Children whose composite score was below the average range, below a standard score of 90, were considered "Below-Benchmark." These children were not exhibiting early literacy skills at a level comparable to their age peers. Additionally, a child was identified as "Below-Benchmark" if two of the three subtest scores were below 90. For children whose assessments were conducted primarily in Spanish, if either of the two administered subtest scores were below 90, they were identified as "Below-Benchmark." Children who were identified as "Below-Benchmark" were assessed monthly with progress monitoring measures including the PALS-PreK. As a result, these children were assessed at least seven times on the PALS-PreK and other

progress monitoring measures compared to the three assessment points for all participating children. Children who were identified as "Below-Benchmark" were assessed monthly with progress monitoring measures including the PALS-PreK. As a result, these children were assessed at least seven times on the PALS-PreK and other progress monitoring measures compared to the three assessment points for all participating children.

For the current study the classroom fidelity measures were used to group participating classrooms into three categories. Scores from the beginning and end of the year fidelity measures were averaged to compute an average quality of instruction score for each classroom. Based on these scores the classrooms were divided into three groups: high, medium, and low. The high group consisted of classrooms whose fidelities average above 90%. These were classrooms that exceeded the expectations of the Wy-ERF project. The medium group consisted of classrooms whose fidelities averaged between 80 and 90%. These were classrooms who met the expectations of Wy-ERF project, which were minimum scores of 80% on classroom fidelities. The final group consisted of classrooms whose fidelities averaged below 80% and did not meet Wy-ERF expectations. This system for classification resulted in the following: 4 classrooms (n=42) in the high group, 8 classrooms (n=68) in the medium group, and 6 classrooms in the low group (n=67).

Research Design and Data Analyses

The study was conducted using a quantitative design employing both between-subject and repeated measures analyses. The research questions for the study were:

1. Do children who are identified as average (Benchmark) or below average (Below Benchmark) on a standardized early literacy measure perform differently on alphabet knowledge tasks over time after controlling for age?

2. Is the above relationship between children's performance on the TOPEL and alphabet knowledge tasks impacted by a child's home language status?
3. After controlling for age, is the trajectory of children's letter knowledge growth different for below benchmark children based on the quality of their classroom instruction fidelity?

To answer the first and second research questions, a repeated measures analysis of variance was conducted on beginning, middle, and end of the year assessment data to determine if there were differences in the patterns of performance on the PALS-Pre K based on classification as at or below benchmark and identification as an English-only or ELL students after controlling for age. Age was included as a covariate due to the assumption that children are more familiar with letters and letter names as they age. Standard scores on the TOPEL are adjusted for age, which is what children's classification as at or below benchmark are based on. However, age is not a factor in scores on the PALS-PreK. Therefore, by including age as a covariate, any group differences observed were present after accounting for the age of the children in the groups. In the first analysis, the independent variable was the child's classification status (at or below benchmark) and the dependent variable was their alphabet knowledge as measured by their performance on the PALS-Pre K. The between subject variable was the child's classification status (at or below benchmark) and the within subject variables included time and the interaction between time and classification status. For analysis of the second research question, the independent variables were the child's classification status (at or below benchmark) as well as their home language status (English, ELLs). The dependent variable was again the child's alphabet knowledge or their performance on the PALS-Pre K. The between subject variables were the child's classification status (at or below benchmark) as well

as their home language status (English, ELLs). The within subject variables included time and the interaction between time and the child's classification.

To answer the third research question a repeated measures analysis of variance was conducted to evaluate the changes in student performance throughout the year, specifically comparing the performance of below benchmark children based on the fidelity of instruction observed in their classroom. Age was again included as a covariate so that any patterns of differences observed were present after accounting for age. The repeated measures analysis of variance evaluated the trajectory of children's growth and performance across seven time points, monthly assessments conducted from October to April. Children with missing data points were not included in the analysis. The independent variable for this research question was the quality of classroom instruction as indicated by the classroom's category, high, medium, or low. The dependent variable was the child's performance on the PALS-Pre K which measures their alphabet knowledge. The between subject variable was the quality of classroom instruction the child received, again indicated by the classroom's category. The within subject variables were time and the interaction between time and the classroom quality classification.

These analyses were conducted using a .05 level of significance with Bonferroni corrections used as necessary for follow-up analyses to control for Type I error. For example, Bonferroni corrections were used in analyzing differences between pairs of groups of children (e.g., benchmark classification).

The third question was also evaluated using latent growth modeling. Latent growth models estimate growth by evaluating repeated measures of one or more dependent variables as a function of time and other measures (Keith & Reynolds, 2009; Meredith & Tisak, 1990). In this case, the model suggests that the alphabet knowledge scores of children designated as below

benchmark across seven times points were the product of two latent variables, specifically, their initial alphabet knowledge score and growth of their alphabet knowledge across time. Two additional variables were included to better explain children's growth over time. These variables were age and classroom quality. Age was again included as a covariate to control for differences in alphabet knowledge performance associated with children's age. The initial factor was also regressed on age, therefore explaining variation in the differences observed at the first measurement time point, as well as the trajectories. In this analysis, classroom quality was defined as a continuous variable rather than a categorical variable, and was the quality of classroom instruction as measured by the average fidelity score of the child's classroom. Latent growth modeling was used to determine the amount of variation in the trajectory of children's alphabet knowledge growth that can be explained by differences in classroom quality.

CHAPTER IV

RESULTS

The results of the data analyses are presented in this chapter and are organized according to the research questions proposed.

Research question one: Do children who are identified as average (Benchmark) or below average (Below Benchmark) on a standardized early literacy measure perform differently on alphabet knowledge tasks over time after controlling for age? Repeated measures analysis of variance was conducted to evaluate changes in children's performance over the course of the academic year and to determine whether there were differences in the patterns of performance based on classification as at or below benchmark performance after controlling for age. Benchmark status was determined using beginning of the year TOPEL scores. Assumptions of sphericity ($p<.001$) as well as assumptions of equality of variance ($p<.001$) were not met as the test for each was statistically significant. Mauchly's test of sphericity for time resulted in Mauchly's W (df=2) =.75, $p<.001$. Box's test of equality of variance resulted in F (6, 152087.18) =7.96, $p<.001$. The violated assumptions indicate that the results should be interpreted more conservatively, relying on multivariate tests Wilks'Λ in determining significance. Similarly, although not-reported in the following summaries, relying on Greenhouse-Geisser values of adjusted significance levels would not affect outcome decisions. In the analysis, between subject and within subject factors were considered. The between subject variable was the child's classification (at or below benchmark) and the within subject variables included time and the interaction between time and classification. Age is included as a covariate due to the assumption that children are more familiar with letters and letter names as they age. The means, unadjusted and adjusted for age, and standard deviations for children identified as at or below benchmark at

the beginning, middle, and end of the school year are presented in Table 2. Age is defined as the child's age in months as of September 1 of the first year of the child's participation in the program. The unadjusted means indicate the average number of uppercase letters children were able to correctly label at each time point. The adjusted means indicate estimated values with the age held constant at 46.28, the mean age for the sample.

Table 2

Mean Number of Uppercase Letters and Standard Deviations for Children Identified as Below or At or Above Benchmark

	N	Age	Beginning	Middle	End
Below	106	45.30 (7.26)	2.51 (4.41)	9.41 (7.96)	14.82 (8.69)
			2.90	9.91	15.33
At or Above	71	47.75 (6.40)	8.62 (8.62)	15.59 (9.54)	19.66 (8.19)
			8.04	14.84	18.91
Overall	177	46.28 (7.01)	4.96 (7.08)	11.89 (9.12)	16.76 (8.80)
			5.47	12.37	17.12

Note. Standard deviations are in parentheses.
Estimated marginal means, adjusted for age, are directly below the unadjusted values.

The between-subjects effect of classification was significant, $F(1, 174) = 22.40$, $p < .001$ as was the covariate of age, $F(1, 174) = 50.03$, $p < .001$. However, the within-subjects effect of time, Wilks' $\Lambda = .98$, $F(2, 173) = 2.16$, $p = .12$, as well as the interactions between time and age, Wilks' $\Lambda = .98$, $F(2,173) = 1.39$, $p = .252$, and time and classification, Wilks' $\Lambda = .98$, $F(2, 173) = 1.73$, $p = .180$, were not significant. Additionally, partial-eta squared values indicated that the covariate, age, accounted for a significant proportion of the variance in PALS-PreK scores, explaining approximately 22% of the variance. Similarly, partial-eta squared values suggest that

when age was held constant at 46.28 months, the mean age for the sample, approximately 11% of the variance was explained by children's classification as at or below benchmark. After controlling for age, time was not a significant variable. In contrast, if the analyses were run without the inclusion of age, the within-subjects effect of time was significant, Wilks' $\Lambda = .30$, $F(2,174) = 201.47$, $p < .001$, suggesting overlap in the portion of variance explained by the two variables, time and age. Figure 1 illustrates the results of theanalyses including both significant and nonsignificant effects.

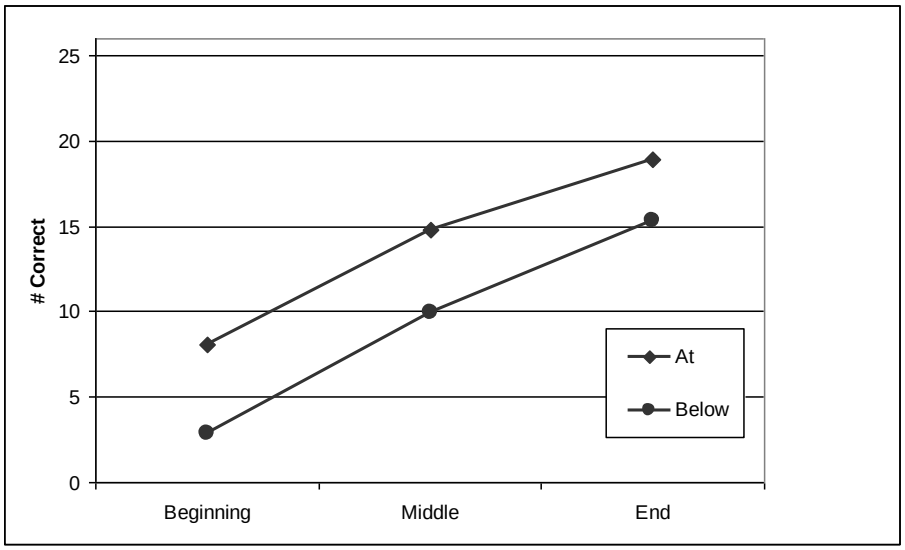

Figure 1. Children's performance on the PALS-PreK across the academic school year based on designation as at or below benchmark using estimated marginal means; age held constant at 46.28 months.

Research question two: Is the relationship between children's performance on the TOPEL and alphabet knowledge tasks impacted by a child's home language status? The analyses for the second question build on those conducted to answer the first research question. The second research question evaluated changes in children's performance over time based on both classification as at or below benchmark as well as identification as an English-only (E-only) or ELL student after controlling for age. Assumptions of sphericity (Mauchly's W (df=2) =.75, p<.001) as well as assumptions of equality of variance ($F(18, 3810.89) = 3.69$, p<.001) again were not met as the test for each is statistically significant. Due to the violated assumptions,

multivariate tests Wilks' Λ were used again in interpreting results. In this analysis between subject and within subject factors were considered. The between subject variables were the child's classification (at or below benchmark) as well as their home language (English-only or ELL) and the within subject variables included time and the interactions between time and classification, time and home language and the three way interaction of time, classification and home language. Age is again included as a covariate due to the assumption that children are more familiar with letters and letter names as they age. The means and standard deviations for children according to both their benchmark and home language at the beginning, middle, and end of the school year are presented in Table 3.

Table 3

Mean Number of Uppercase Letters and Standard Deviations by Benchmark and Home Language Status

	Language	N	Age	Beginning	Middle	End
Below	E-Only	64	45.52 (6.50)	2.20 (3.38)	8.80 (8.15)	14.00 (8.87)
				2.51	9.19	14.39
	ELL	42	44.98 (8.36)	2.98 (5.65)	10.33 (7.68)	16.07 (8.35)
				3.50	11.01	16.74
At or Above	E-Only	62	48.04 (6.29)	8.85 (8.75)	15.97 (9.42)	20.21 (7.94)
				8.15	15.06	19.31
	ELL	9	45.67 (7.18)	7.00 (7.86)	13.00 (10.52)	15.89 (9.36)
				7.25	13.32	16.20
Overall	E-Only	126	46.76 (6.49)	5.48 (7.37)	12.33 (9.47)	17.06 (8.95)
				5.33	12.13	16.85
	ELL	51	45.10 (8.10)	3.69 (6.20)	10.80 (8.19)	16.04 (8.44)
				5.37	12.16	16.47

Note. Standard deviations are in parentheses; E-Only= English only; ELL = English Language Learner
Estimated marginal means, adjusted for age, are directly below the unadjusted values.

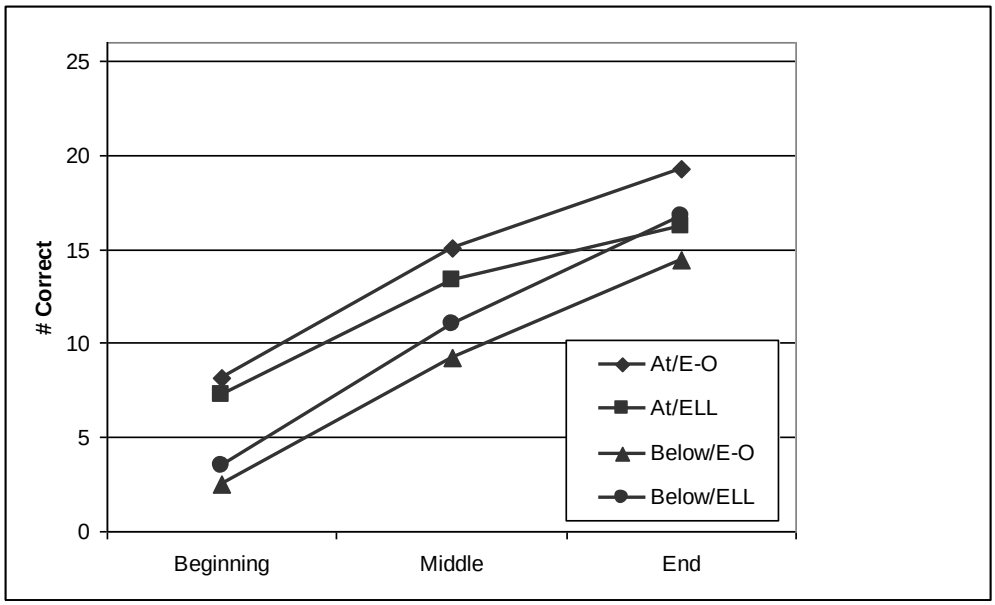

Figure 2. Children's performance on the PALS-PreK across the academic school year based on designation as at or below benchmark and English-only (E-only) or English language learner (ELL) using estimated marginal means; age held constant at 46.28 months.

As was seen in the previous analysis, the between subjects variable of benchmark classification, $F(1,172)=8.40$, $p<.05$, and the covariate age, $F(1,172)=49.62$, $p<.001$, were statistically significant. The other between subject main effects for home language, $F(1, 172)=.01$, $p=.94$, and within subject effect of time, Wilks' $\Lambda = .98$, $F(2, 171)=2.02$, $p=.14$, were not significant. In addition, none of the two- or three-way interaction effects among the variables were statistically significant. As was seen in the previous analysis, the covariate age explained 22% of the variance. In this analysis, after controlling for age, significant differences were observed between children identified as at (Adjusted M = 13.21; SD = 9.26) or below benchmark (Adjusted M = 9.56; SD = 6.34), accounting for approximately 5% of the variation in scores based on partial-eta squared. Figure 2 illustrates the results of the three way interaction between time, benchmark classification, and ELL status, after controlling for age. While visual inspection suggests differences in the performance of E-only and ELLs in each benchmark classification as well as a possible three-way interaction effect for ELLs across benchmark status

and time, these differences did not reach the nominal level of statistical significance set for this study.

Research question three: After controlling for age, is the trajectory of children's letter knowledge growth different for below benchmark children based on the quality of their classroom instruction fidelity? The third research question was analyzed in two different ways. The first analysis used repeated measures analysis of variance to evaluate changes in student performance throughout the year, by specifically comparing the performance of below benchmark children based on the fidelity of instruction observed in their classroom. Fidelity of instruction was conceptualized as a categorical variable with three categories: high, medium, and low. The high group consisted of classrooms whose fidelities averaged above 90% using Wy-ERF Fidelity of Implementation measures. The medium group consisted of classrooms whose fidelities averaged between 80 and 90%. The final group consisted of classrooms whose fidelities averaged below 80%. This system for classification resulted in 4 classrooms in the high fidelity group, 8 classrooms in the medium fidelity group, and 6 classrooms in the low fidelity group. Additionally, the mean average fidelity score for the high group was 91.32 (range=90-93; SD = 1.68), 85.67 (range=82-88; SD = 1.82) for the medium group, and 76.27 (range= 69-79; SD = 1.92) for the low group. In this analysis, only below benchmark students were included, consisting of an initial sample size of 107. However, data for two children were omitted due to one or more missing data points, resulting in a sample of 105 children with an average age of 45.42 months (range= 29-60 months, *SD*= 7.19) as of September 1 of the first year of the child's participation in the program. Of those 105, 22 (21%) were in the high fidelity classroom group, 42 (40%) were in the medium fidelity classroom group, and 41 (39%) were in the low fidelity classroom group. Children identified as below benchmark based on their initial

TOPEL scores were assessed monthly for progress monitoring purposes, resulting in seven time points across the academic year, as opposed to the three assessment time points for all children.

Assumptions of sphericity (Mauchly's *W* (df=20) =.04, p<.001) as well as assumptions of equality of variance (*F*(56, 15379.10) =1.98, p<.001) again were not met as the test for each was significant indicating the results should be interpreted more conservatively, relying on the Wilks' Λ value for multivariate tests of significance. Between subject and within subject factors were considered. The between subject variable was the average level of fidelity for the child's classroom (low, medium, or high) and the within subject variables included time and the interaction between time and classroom fidelity group. Age was again included as a covariate due to the assumption that children are more familiar with letters and letter names as they age. The means and standard deviations for children according to their classroom fidelity group across seven assessments conducted monthly throughout the academic school year are presented in Table 4.

In this analysis the between subjects effect for age, $F(1, 101) = 15.09$, $p<.001$ was the only statistically significant finding. The main effects for time, Wilks' $\Lambda = .98$, $F(6, 96) = .37$, $p=.89$, and fidelity group, $F(2, 101) = 1.19$, $p=.31$, were not significant. In addition, none of the interaction effects among the variables were statistically significant. In this analysis, the covariate, age, explained 13% of the variance. Figure 3 illustrates the results of the analyses. Again, visual inspection suggests differences in the performance of children based on their classroom's fidelity grouping as well as possible interactions between fidelity group and time; however, these differences did not reach the nominal level of statistical significance.

Table 4

Mean Scores and Standard Deviations by Classroom Fidelity Group Across Time

Group	N	Age	1	2	3	4	5	6	7
Low	41	45.51	2.27	5.78	6.39	8.59	10.29	11.17	13.39
		(6.61)	(4.73)	(7.14)	(7.78)	(8.74)	(9.98)	(9.56)	(9.89)
			2.25	5.76	6.36	8.55	10.26	11.13	13.35
Medium	42	44.40	2.05	5.67	7.33	8.93	12.07	13.50	15.21
		(7.47)	(3.41)	(5.20)	(5.82)	(7.32)	(7.50)	(7.83)	(7.96)
			2.25	5.93	7.65	9.31	12.44	13.93	15.64
High	22	47.18	3.81	7.55	9.86	11.64	13.41	15.91	16.86
		(7.66)	(5.43)	(6.72)	(7.05)	(7.71)	(7.93)	(8.26)	(7.66)
			3.47	7.09	9.32	10.98	12.77	15.17	16.12
Total	105	45.41	2.50	6.10	7.50	9.36	11.66	13.10	14.85
		(7.19)	(4.43)	(6.32)	(6.95)	(8.00)	(8.64)	(8.73)	(8.73)
			2.66	6.26	7.78	9.61	11.82	13.41	15.04

Note. Standard deviations are in parentheses.
Estimated marginal means, adjusted for age, are directly below the unadjusted values.

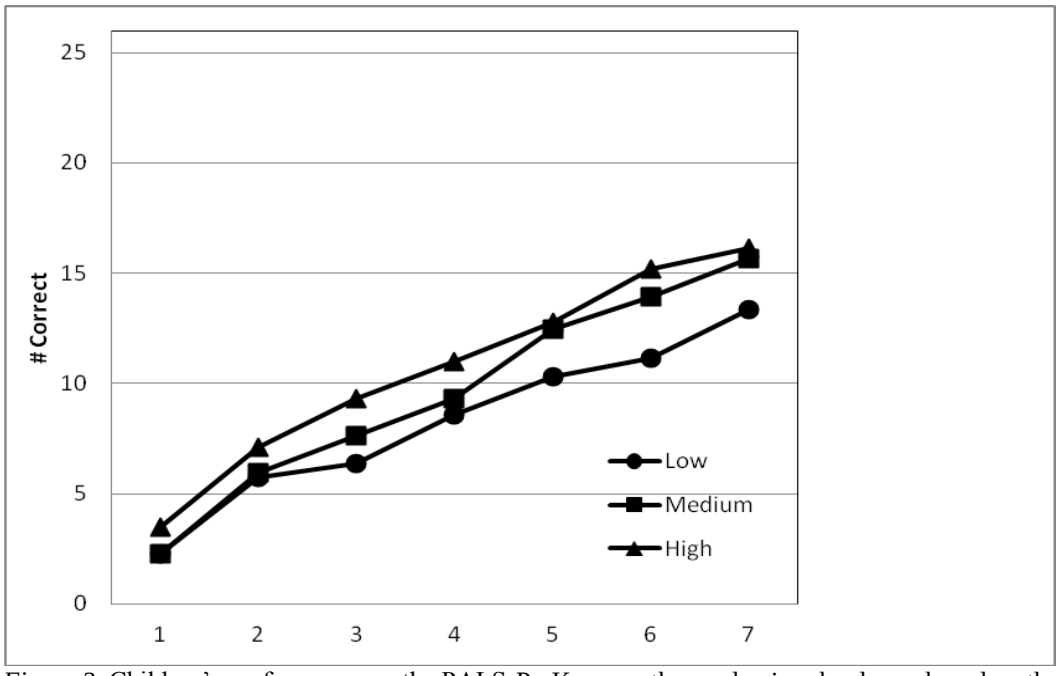

Figure 3. Children's performance on the PALS-PreK across the academic school year based on the fidelity grouping (low, medium, and high) of the child's classroom using estimated marginal means; age held constant at 45.42 months.

The third research question was also analyzed using latent growth modeling in order to evaluate more specifically the amount of variation in the trajectory of children's alphabet knowledge growth that can be explained by differences in classroom fidelity, after adjusting for age. In this analysis, data for all children initially identified as below benchmark were included, regardless of missing data points, resulting in a sample of 114 children with an average age of 45.21 months (range= 29-60 months, *SD*= 7.24) as of September 1 of the first year of the child's participation in the program. This sample includes children who were not included in the previous analyses for the previous research questions, as these children were missing data points for both the three assessment points and seven assessment points, resulting in a larger sample size for this analysis than for previous analyses. In this analysis classroom fidelity was included as a continuous variable based on the average fidelity score in the child's classroom. For this sample, the mean average fidelity across all classrooms was 83.26 (range=69-93, *SD*=6.08). To aid interpretation, both age and fidelity were centered around their respective means, resulting in a mean of zero for each of the two explanatory variables. Model fit was evaluated with the chi-square (χ^2) test statistic, root mean squared error of approximation (RMSEA; Steiger & Lind, 1980), and comparative fit index (CFI; Bentler, 1990). In terms of model fit, RMSEA values of less than .10 (MacCallum, Browne, & Sugawara) and CFI values greater than .95 (Hu and Bentler, 1999) are generally considered to indicate that the model adequately represents the data.

In the presented models, the intercept variable or initial assessment is labeled "ICEPT", the slope is labeled "SLOPE", and the standard deviations of those variables are labeled "DevIcept" and DevSlope, respectively. The assessment time points are labeled with the month of their administration and the error variables or residuals were labeled as sequential "E". Finally, the explanatory variables, age and fidelity were labeled as "zeroed_age" and

"zeroed_fidelity", reflecting that each variable was centered around its mean before its inclusion in the model. Figure 4 illustrates the first model that was used to estimate the relationships among the variables. A linear growth trajectory was imposed. However, the fit of the data to this initial model was poor ($\chi^2[34] = 190.37$, RMSEA= 0.20, CFI = 0.86). Therefore, a modified model was analyzed in which the residuals were correlated with adjacent time points. Model fit improved (χ^2 [28] = 128.72, RMSEA = 0.18, CFI = 0.91; $\Delta\chi^2$ [6] = 61.65), further suggesting that the assumption regarding independent and uncorrelated error for repeated measures analysis was violated.

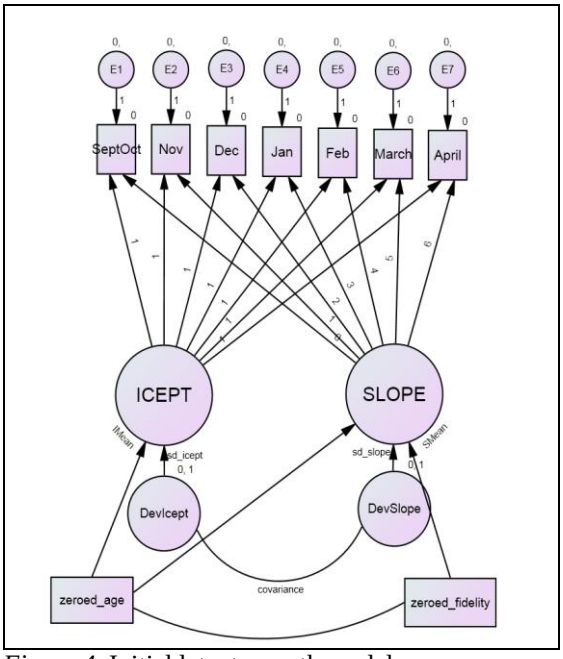

Figure 4. Initial latent growth model

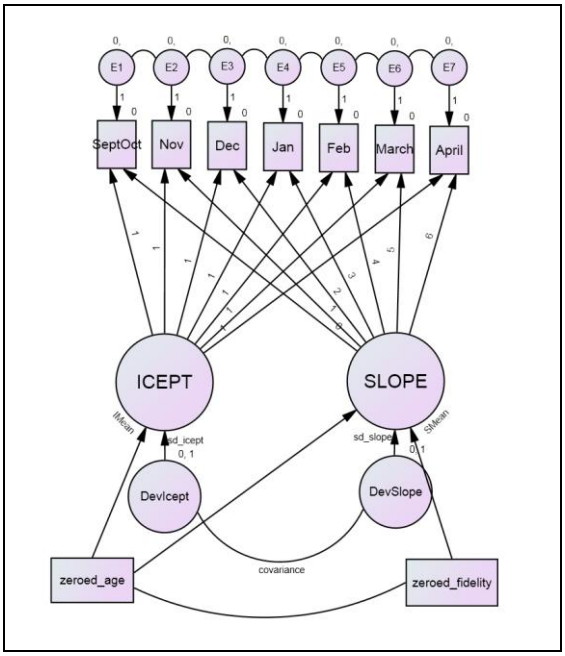

Figure 5. Improved latent growth model

In order to test if linear growth was a reasonable assumption, an additional model that allowed for an empirically defined trajectory was estimated. This latent basis growth model allows for flexibility in modeling nonlinear change as it does not have a predetermined functional form (Grimm, Ram, & Hamagami, 2011). It is appropriate for this research because there was no a priori defined average trajectory, and the interest here was in understanding the variation in trajectories during the observational period, not to define a trajectory related to a

developmental process that will continue to unfold over time. In the latent basis model the factor loadings between time 0 and time 6 for the slope parameters, from the September/October assessment through the April assessment, were freed. Allowing for the empirically defined trajectory resulted in a statistically significant improvement in model fit from the second model proposed as illustrated in Figure 5 ($\chi^2[23] = 71.26$, RMSEA = 0.14, CFI = 0.96; $\Delta\chi^2$ [5]= 57.46, $p < .001$). The RMSEA was less than optimal, but this was likely due to the small sample size, as recommendations for the sample sizes necessary to adequately test goodness of fit using RMSEA with similar degrees of freedom are significantly larger (MacCallum et al., 1996). Parameter estimates from the improved model are shown in Table 5.

Table 5

Parameter Estimates of Improved Latent Growth Model

Parameter	
Intercept mean	2.34 (.39)
Slope mean	1.83 (.14)
Intercept standard deviation	3.90 (.39)
Slope standard deviation	1.37 (.11)
Intercept-slope covariance	-.06 (.13) [ns]
Age-fidelity covariance	-.06 (4.11)[ns]

Note. Standard Errors are in parentheses.
[ns] Not statistically different than zero. Parameter estimates were significant at p<.05 unless otherwise noted.

The intercept mean is the average initial estimate of letter knowledge at the first assessment for a child who was at the average age for the sample. Although the intercept mean was 2.34, it is important to note that even in this sample of children identified as below benchmark, the initial estimate of letter knowledge ranged from 0 to 26 letters, meaning the full range of possible scores was observed even at the initial assessment. The slope mean indicates the average growth from one assessment to the other, approximately 2 letters (1.83) per month. However, as was previously discussed the improved model suggests non-linear growth. Greater

gains were observed at the time points earlier in the academic year, with 1/3 of the growth occurring after the first month. The estimated unstandardized loadings as well as the cumulative and monthly percentages of growth are shown in Table 6. The intercept and slope standard deviations, presented in Table 5, indicate the extent of variation around the mean values and represent the individual differences in the intercept and slope not explained by age or fidelity. The intercept-slope covariance was not statistically significant indicating that the initial estimate of alphabet knowledge was not related to growth in alphabet knowledge.

Table 6

Loadings and Relative Growth of Final Latent Growth Model

	Loading	Percentage of Growth	Cumulative Growth	Squared Multiple Correlations
Sept/Oct	0.00	0.00	0.00	.90
Nov	1.99	.33	.33	.76
Dec	2.80	.14	.47	.82
Jan	3.89	.18	.65	.84
Feb	5.00	.18	.83	.95
March	5.42	.07	.90	.87
April	6.00	.10	1.00	.85

Note. Cumulative growth = loading/6; Percentage of growth= cumulative growth-previous cumulative growth

In addition, the average of the squared multiple correlations (see Table 6) for the measurements at each time was .86 (range= .76-.95), suggesting the model performed well in explaining the variation in those estimates. Similar to the results of the repeated measures analysis, age was a significant factor in the model, independently explaining a significant portion of the variance in the intercept or initial level of alphabet knowledge. Age, however, did not explain a statistically significant portion of the slope variable. The unstandardized effect of age on the intercept and slope were .19, $p<.05$, and .03, $p=.15$, respectively. Again, similar to the repeated measures analysis, fidelity or classroom quality scores did not explain a significant portion of the variance in the slope or trajectory of children's alphabet knowledge growth, with

an unstandardized effect of .03, p=.22. Based on the squared multiple correlations for the intercept (.12) and slope (.03) factors, 88% of the variance in initial levels of alphabet knowledge remained unexplained, and 97% of the slope variance remained unexplained. The latent growth model analysis reiterated the outcomes of the repeated measures analysis in terms of the significant role age played in the outcomes observed, specifically the impact of age on the initial assessment value. The latent growth model also provided additional information regarding the trajectory of growth and rate of growth across the academic year. Classroom fidelity did not influence the growth of alphabet knowledge over time. The final model with the estimated unstandardized effects and relationships among the variables are illustrated in Figure 6. The model illustrates the direct relationships among the variables, including error variables with straight lines and illustrates covariance among the variables with curved lines. The unstandardized parameters and estimates are also presented in the figure.

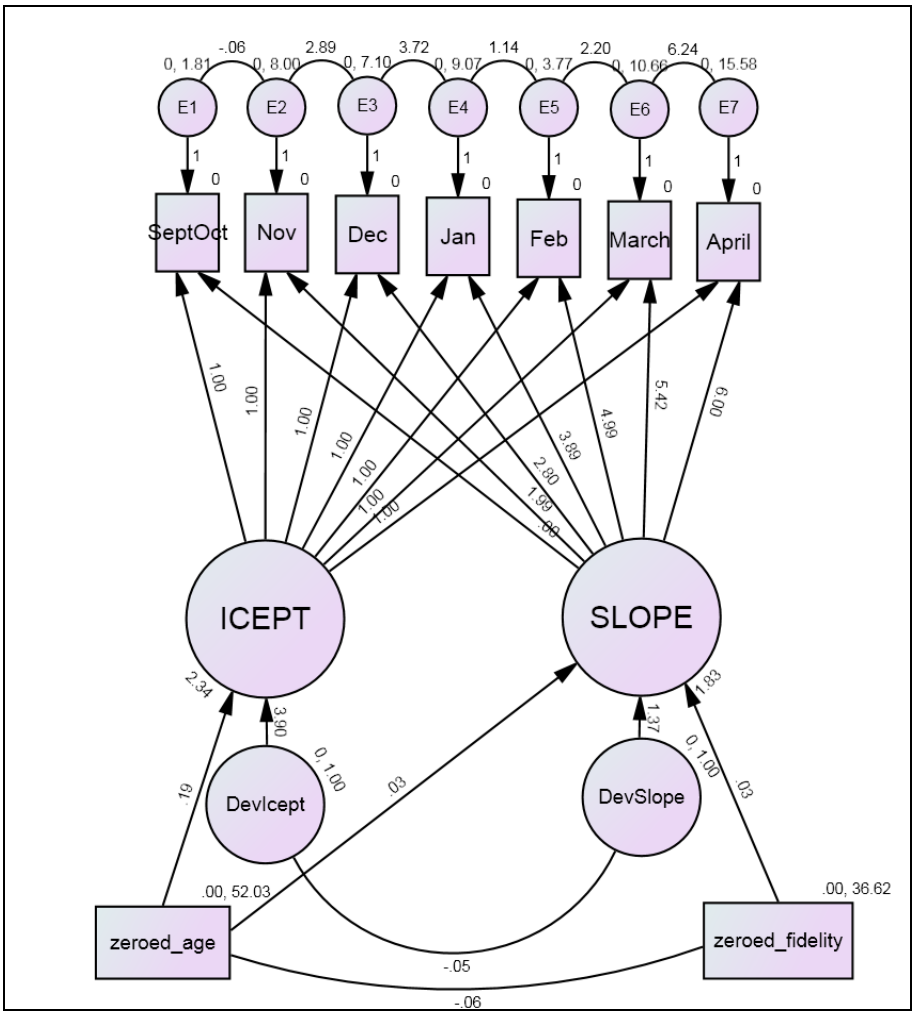

Figure 6. Final latent growth model with unstandardized effects

CHAPTER V

DISCUSSION

This study analyzed the performance and growth in letter knowledge and letter identification skills of children participating in the Wy-ERF project across an academic year. Repeated measures analyses of variance were conducted to examine differences among children's performance based on a number of variables including initial classification as at- or below-benchmark, home language status, time, and quality of instruction in the child's classroom. Additionally, latent growth models were analyzed to evaluate the relationships among the variables relative to the trajectory of growth of letter knowledge skills for children identified as below benchmark. The findings indicate positive growth for the children participating in the program, in terms of the numbers of uppercase letters they were able to identify, and some observable differences between identified groups of children. However, the differences and changes observed did not always meet levels of statistical significance. Across all analyses, age explained a significant portion of the variance in the number of letters children were able to correctly identify. These findings align with the literature that has consistently found that age and maturation play a significant role in children's acquisition of early literacy and alphabet knowledge (Dodd & Carr, 2003; Justice, Invernizzi, Gell, Sullivan, & Welsh, 2005; U.S. Department of Education, 2001; Worden & Boettcher, 1990). Children within this study ranged from 29 to 60 months (2 years 5 months to 5 years) at the beginning of their first year of participation in the program, a key developmental time period in terms of the accumulation of early literacy and skill development (Worden & Boettcher, 1990). Another interesting finding, consistent across all analyses was the lack of significance of time. Although on average children gained approximately 12 letters across the academic year, the changes observed did not reach

statistical significance. The portion of variance explained by time may overlap with the portions of variance explained by both individual differences and age. Repeated measures procedures control for individual differences as the same individuals are measured at each time point and age was controlled for in its inclusion as a covariate across all analyses. While changes across time were not statistically significant, the sizable gains made by children in the Wy-ERF program are encouraging in regards to their skill development prior to kindergarten entry. The one exception in terms of significant growth was in the latent growth model, where the slope was significant. Although conceptualized differently, in the latent growth models, the slope was positive and significantly different from zero, indicating significant growth was made across the academic year. Additional findings specifically related to each of the individual research questions are discussed below.

Research question one: Do children who are identified as average (Benchmark) or below average (Below Benchmark) on a standardized early literacy measure perform differently on alphabet knowledge tasks over time after controlling for age? The analysis related to question one suggests significant differences in the alphabet knowledge of children identified as at- or below-benchmark. The significant main effect for benchmark status indicates that children identified as at-benchmark performed differently, and specifically performed better on the PALS-PreK than children identified as below-benchmark and that those differences were maintained across time. These findings lead to two different discussion points. The first point is in regards to the use of the TOPEL for differentiating children based on their alphabet knowledge and early literacy skills. The administration of the TOPEL and the procedures described in this study that were used to identify children as at- or below-benchmark did result in statistically significant groups of children in terms of their letter-name knowledge based on their

performance on the PALS-PreK. These differences on the PALS-PreK were not only observed at the beginning of the year (the time period closest to the TOPEL administration), but were maintained across the academic year. This is good news as it relates to the use of the TOPEL as a tool to identify young children whose early literacy skills are below that of their age peers and therefore may be at-risk for later reading difficulties. As research has shown that children's academic trajectories are set at a very young age and that children who are behind their peers in reading and literacy tasks tend to stay behind, it is very important to be able to identify at-risk students early on in order to attempt to remediate discrepancies in skill (Downer & Pianta, 2006; Hamre & Pianta, 2001; Snow, Burns, & Griffin, 1998). Early intervention literature related to both prevention and response to intervention models emphasize the importance of accurate screening and progress monitoring tools to identify children in need of more intense instruction as well as tools that help teachers and other professionals make data-based decisions in designing and implementing individualized instruction (Gettinger & Stoiber, 2007; Justice & Pullen, 2003). In this study the TOPEL was used as a screening tool and accurately differentiated children in terms of their letter-name knowledge, the first step in providing appropriate instruction and intervention as part of the Wy-ERF project.

The other discussion point related to the results of question one is that while the TOPEL did identify statistically different groups of children, those statistical group differences were maintained across the academic year. All children made considerable gains in the number of uppercase letters they were able to identify. Ideally, children identified as at-risk would increase at such a rate as to be statistically indistinguishable from their peers at the end of the intervention or academic year, given the relative stability in children's literacy skills that has been observed (Hammill, 2004; Whitehurst & Lonigan, 1998). However, given that all of the children

participating in the project received intensive, literacy-focused instruction, children initially performing at or above expected levels would also be projected to make considerable growth, as was observed. Therefore a realistic goal for early intervention programs such as Wy-ERF is to accelerate the learning of children identified as at-risk so that their assessment results indicate performance at least in the average range, which was observed in the current study. More specifically, the Wy-ERF goal and kindergarten readiness benchmark was 12 letters, which was achieved by most of the children participating in the project. All of the children participating in Wy-ERF received intensive early literacy instruction, which included explicit alphabet knowledge teaching, and made gains in their letter-name knowledge. As a result, even though the groups maintained statistical differences, most of the children in the Wy-ERF project ended the year performing in or above the average range across a number of early literacy and alphabet knowledge measures and were better prepared for kindergarten entry, which was the one of the primary goals of the Wy-ERF project (Abbott, 2007; Abbott et al., 2011).

Research question two: *Is the relationship between children's performance on the TOPEL and alphabet knowledge tasks impacted by a child's home language status?* Similar to the results of question one, the analysis related to question two suggest significant differences in the alphabet knowledge of children identified as at- or below-benchmark and that those differences are maintained across home language status. Significant differences were not observed between English-only (E-only) and English language learners (ELLs); however the small group numbers, specifically for at-benchmark ELLs (n=9), may have limited the ability to detect significant differences between language groups. Again, based on the analysis, the administration of the TOPEL and the procedures described in this study that were used to identify children as at- or below-benchmark did result in statistically significant groups of

children in terms of their letter-name knowledge as measured by the PALS-PreK regardless of the child's home language status. This further validates claims by Muter and Diethelm (2001) that English language phonological screening instruments, including measures of letter knowledge, were effective predictors of later reading ability and therefore potential screening tools for at-risk poor readers among children whose first language is not English.

Although the differences between ELLs and E-only children were not significant, interesting observations regarding the performance of ELLs can be made based on the analysis of the data. While research has shown that ELLs tend to struggle academically and tend to be behind their peers in terms of reading and literacy skill development (Davison et al., 2004; Farver et al., 2009; Snow, et al., 1998); results from the current study were mixed. While at-benchmark ELLs did perform below their at-benchmark E-only peers, below-benchmark ELLs performed better than their E-only below-benchmark peers. Again, although the group size for at-benchmark ELLs was significantly smaller than below-benchmark ELLs, by the end of the year, the below-benchmark ELLs appeared to be able to identify approximately the same number of uppercase letters as the at-benchmark ELLs on the PALS-PreK, ending the year at 16.07 and 16.04 letters correctly identified respectively. The results of this study specific to ELLs were likely limited due to the significant differences in sample size, which in turn could be related to the process of identifying below-benchmark for ELLs. While all three subtests and the resulting Early Literacy Index of the TOPEL were used to identify below-benchmark for English-only children, the scores from only two subtests were used for ELLs as the third subtest could not be translated and fairly scored. As a result, error likely played a more significant role in the benchmark status for ELLs. Additionally, the intriguing results of the study regarding the performance of below-benchmark ELLs relative to both at-benchmark ELLs and below-

benchmark E-only peers may be related to the language and literacy experience of those children prior to their entry in the Wy-ERF classrooms. These children may have had more limited exposure to literacy opportunities, specifically English language literacy opportunities and therefore performed below their peers and below-benchmark at the initial assessment. However, after only brief exposure and instruction they were able to benefit, perhaps due to increased sensitivity to salient features of language suggested by previous research (Bruck & Genesee, 1995; Campbell & Sais, 1995; Muter & Diethelm, 2001). Of all of the groups identified, below-benchmark ELLs made the largest gains and had the most dramatic positive slope. However it is also important to note that this was one of the groups with the most room for growth in terms of their letter-name knowledge.

Research question three: After controlling for age, is the trajectory of children's letter knowledge growth different for below benchmark children based on the quality of their classroom instruction fidelity? The primary variable of interest in the repeated measures analysis of variance study, classroom quality group, was not significant, suggesting that there were no differences in the performance on the PALS-PreK of children based on the quality of classroom instruction they received. Similarly, the fidelity variable did not significantly impact the trajectory of growth in the latent growth model analysis. While previous research has shown that high-quality language and literacy experiences in early childhood settings can significantly impact children's language and academic skill development (McCartney, 1984; NICHD ECCRN & Duncan, 2003) and that classroom quality maybe the single most important factor that influences achievement (Justice et al., 2008; Nye, Konstantopoulos, & Hedges, 2004), others have pointed out the complexities in conceptualizing and identifying quality instruction (Domínguez et al., 2010; Justice et al., 2008; NICHD ECCRN, 2000). Quality early literacy

instruction includes aspects of both structure and process. The process of literacy instruction requires consideration of the fidelity with which the process is implemented. Fidelity is also a complex concept that lacks a consensus definition and metric for measurement (Hagermoser Sanetti & Kratchowill, 2009). Despite the difficulties in quantifying quality and fidelity in terms of early literacy intervention, there is a considerable amount of research that verifies the importance of early intervention programs and opportunities in terms of reducing gaps for disadvantaged students, allowing children from poverty to enter kindergarten with skills comparable to their peers (Abbott et al., 2011; Perez-Johnson & Maynard, 2007). For this study all of the participating classroom teachers were receiving a high level of support regarding the implementation of early literacy instruction.

Although the results are mixed in terms of the significance of the increases made over time, positive trends were observed for all children in their performance on the PALS-PreK across the academic year. The results of the analysis imply that literacy instruction, specifically alphabet knowledge instruction was happening in the classrooms no matter the level of fidelity. The positive trends observed are of particular importance when considered in the context of research that suggests that developmental trends and trajectories, rather than the level of skill development, are predictive of children's later reading ability (Lyytinen et al., 2000). Additional child outcome data from the Wy-ERF project has demonstrated its effectiveness in terms of the sizable gains made in children's early literacy skills and preparedness for kindergarten, including gains made in letter-name knowledge (Abbott et al., 2011). More specifically, results from the latent growth model analysis indicate that children's growth in terms of the number of letters they were able to correctly identify was non-linear. For children who were identified as below benchmark, one third of the observed growth was made between

the first and second assessment points and leveled out over the rest of the academic year. This may have occurred for a number of reasons. The data included in the present study represents the children's first year of participation in the Wy-ERF project. For some of the children this may mean that it was their first time in an educational setting of any kind, for all of the children it was their first exposure to the intensity of instruction of the Wy-ERF project. As a result of the initial instruction children made significant gains in their letter knowledge, suggesting the children were developmentally ready for early literacy instruction and benefitted from the explicit instruction they received. Another possible explanation for the pattern of growth observed has to do with the progression of instruction in the classrooms. Since alphabet and letter-name knowledge are important foundational skills, classroom instruction typically begins with these skills. For example, in the Wy-ERF classrooms, teachers began the year working with students on recognizing their names and the letters in their names. The teachers then followed the curriculum by introducing specific letters, focusing on 2-3 letters per week. Through the academic year, classroom instruction may shift to focus on more complex early literacy skills, for example segmenting and blending sounds, as more and more children indicate their readiness. While alphabet knowledge was still a key component of the Wy-ERF curriculum throughout the academic year, it may not have been emphasized throughout the academic day as much as it was at the beginning of the year. Additionally, at some point, statistically a ceiling effect plays a role in the amount of growth achieved. The upper limit for alphabet knowledge growth in this study was 26 upper case letters correctly identified. While group averages did not approach this limit, the high-performing students in a number of groups, including the below-benchmark students, did. After children were able to correctly identify all 26 letters, there is no possibility for further growth.

It is also important to note that even within the sample of children identified as below-benchmark, there was significant variation in the number of letters they were able to identify throughout the year. From the initial assessment, there were children in the sample who were able to identify all twenty-six letters. Similarly at the end of the year, there were children who were unable to identify any letters. Although the factors included in the models and analyses were able to explain significant portions of the variance, there are likely other factors and individual differences that contribute to the variation in children's performance observed, such as gender (Denton & West, 2002; Downer & Pianta, 2006; Justice et al., 2005), genetics (Laakso et al., 2004; Lyytinen et al., 2006), as well as demographic and environmental factors (Burgess et al., 2002; Hart & Risley, 1995; Lonigan et al., 1998; Raz & Bryant, 1990; Scarborough & Dobrich, 1994).

Limitations

This study, as with any other, has its limitations. First, the Wy-ERF project and as a result the current study was implemented in an applied setting. As such there are a number of variables and factors that could not be controlled. The study did not use random assignment or sampling in the placement of teachers or children in the classrooms. The teachers who participated in the study are those who agreed to be a part of the Wy-ERF project. Teachers and the children in each of the classrooms were assigned to their classroom based on criteria at each site. The lack of control and randomization resulted in unequal group sizes as well as differences across a number of specific child factors that were not considered in assigning children to their classrooms. Similarly, the Wy-ERF project experienced turn-over in staff from year to year as well as during the school year, which also impacted the continuity and quality of instruction. In some cases teaching assignments changed mid-year and both teachers and children moved or left

the project at various points. To overcome some of these limitations, quality of instruction in the classroom was conceptualized as the fidelity to program components observed in the classroom regardless of who was implementing. While fidelity was likely impacted by personnel changes either from year to year or mid-year, those changes also likely impacted the quality of the instruction a child in a given classroom received.

Another limitation of the study was that limited teacher information was collected as part of the project. The intention of the Wy-ERF project was for each classroom to have a bachelor, associate, and certificate level teacher. However, as classroom assignments changed and turnover occurred, these ratios for education level may not have been maintained. In addition, while several of the teachers participating in the project had a bachelor's degree, several of them had degrees from fields other than education, or more specifically early childhood education. As a result, unknown differences in teachers' demographic information including the type and level of education received as well as years of experience in early childhood settings may have also impacted outcomes related to the study. Again the primary focus of the study was on the child outcomes and some of the individual and classroom factors that impacted child outcomes. While teacher factors likely play a role, the reasons for differences in quality of instruction was not a focus of the current study. However, one teacher factor that could directly impact the child outcomes of interest in this study was the level of exposure to Spanish in the classroom, particularly for children from Spanish speaking homes and backgrounds. Some of the teachers who participated in Wy-ERF were proficient in Spanish and were therefore able to provide instruction in both English and Spanish. This may have allowed Spanish-speaking students to easier access to the curriculum as their English language abilities were developing. Spanish-

speaking students who did not have access to instruction in both English and Spanish would not have had the same accessibility to the curriculum.

It is also important to note that the sample for the current study only includes ELLs from Spanish-speaking homes, which may or may not generalize to children from other non-English backgrounds. In addition, ELLs in the sample were assessed by bilingual assessors who could provide direction as well as consider responses in both English and Spanish. In many cases, it is not possible to include bilingual assessors in the development of a study, particularly for children and families from less common language backgrounds. However, as Spanish-speaking children and families represent an increasing proportion of the preschool and school population, it is important to understand the development of literacy skills in children from Spanish-speaking backgrounds.

Just as the conclusions drawn from the study are limited by a number of factors related to the sample, they are also limited by the fact that there was not a control group included in the study for comparison purposes. While comparisons can be made among and between children and classrooms participating in the Wy-ERF project, all of the classrooms and their teachers were receiving a high level of support in implementing early literacy instruction according to the goals of the project. The positive trends observed in this study may or may not be reflective of outcomes for children in other early childhood settings. More specifically, while there were no significant differences between groups of children based on the quality of instruction in their classrooms, it is possible that there would be significant differences between the outcomes of children participating in Wy-ERF and similar measures for children in other traditional daycare or preschool classrooms.

Another limitation of the study is that one of the key measures used, specifically the Fidelity of Implementation, was created specifically for the Wy-ERF project. As such, there is limited information regarding the reliability and validity of the instrument in a broader context. The Wy-ERF project staff created and adapted the instrument based on the goals and needs of the current project. However, its generalizability as a tool for assessing instructional quality across early childhood settings is unknown. Further, in the research design and analysis for this study, fidelity scores were averaged for their inclusion sacrificing some of the variability across classrooms. Similarly, averaging fidelity scores across the academic year does not reflect the progress made in the classrooms in terms of the quality of instruction being provided. Classroom teachers received feedback on their fidelity scores and observations made in the classroom and worked with mentor coaches and project staff to make improvements. While the averaged scores are representative of the overall instruction the children in the classroom received, they may not include the full scope of the quality of instruction the children received.

Despite the limitations, the study was able to provide additional information regarding children's alphabet knowledge and their growth in alphabet knowledge across an academic year as well as some of the factors that impacted each.

Future Research

Given the limitations discussed and the portions of variance left unexplained, there are a number of avenues for future research. To further examine and validate the impact of the Wy-ERF project in terms of alphabet knowledge and broader early literacy outcomes, future research could compare projects like Wy-ERF to the performance of children in typical childcare and early education settings. While additional results from the Wy-ERF project have demonstrated the significant progress made by participating children, specifically those who participated for

two years (Abbott et al., 2011), it would be beneficial for purposes of subsequent research, funding, and program development to be able to further quantify the gains made relative to similar peers in other settings.

Additionally, while it would be beneficial to compare different settings, future research could also seek to identify the specific components of the Wy-ERF program and curriculum that were most impactful in terms of children's letter knowledge growth. As was previously discussed, the concepts of quality and fidelity in education and early childhood education are complex and lack consensus definitions (Domínguez et al., 2010; Hagermoser Sanetti & Kratchowill, 2009; Justice et al., 2008; NICHD ECCRN, 2000). In this study, the quality of classroom instruction was included as a more global variable, encompassing the overall fidelity of instruction to program goals throughout the academic day. However, it is possible that there were specific components or certain times of the day that impacted alphabet knowledge growth more than others. Additional research could try to identify more specifically the components of Wy-ERF that were most effective and would therefore be beneficial to incorporate in early childhood classrooms. For example, it is possible that small group instruction and the quality of that small group instruction played a more significant role in children's learning than did large group or circle time instruction. Alternatively, it is also possible that the process of modeling and then providing guided and independent practice, which occurred throughout the academic day, was more important. Identifying these key components based on the current study and Wy-ERF project could be very beneficial in continuing to understand and define quality instruction. As quality instruction is better defined in the field, it will aid in understanding the process of children's early learning and therefore allow early childhood professionals to be better able to tailor programs to maximize young children's learning potential.

Just as there is a need to better understand specific factors of quality instruction, there is also a need to better understand individual factors that impact children's early literacy knowledge and performance. While this study considered a limited number of demographic factors related to children's development, there is still a large portion of unexplained variance in terms of children's initial letter knowledge as well as in their letter knowledge growth. Future research could use growth mixture modeling to identify characteristics of groups of children who made or did not make progress, to further explain trajectories of children's alphabet knowledge growth. For example, growth mixture modeling could be used to compare groups of children who started high and ended high in terms of the number of letters they were able to identify to groups of children who started low, but made considerable growth, and those who started and ended the year low. In this analysis as in previous research, age was a consistent significant factor in explaining the differences in children's letter naming abilities (Dodd & Carr, 2003; Justice et al., 2005; U.S. Department of Education, 2001; Worden & Boettcher, 1990). However, children's cognitive abilities were not factored into the current study. These as well as other possible individual differences and factors likely played a role in the trajectories of growth observed. The ability to better identify and track children who are at-risk in terms of their early literacy skills, including alphabet knowledge, provides more opportunities to intervene at an early age. Similarly, additional research is needed to further understand early language acquisition and early literacy skill development of young ELLs. While research has shown that ELLs tend to struggle academically and lag behind their peers in reading and literacy skills (Davison et al., 2004; Farver et al., 2009; Snow, et al., 1998), the ELLs in this study, particularly the below-benchmark ELLs demonstrated considerable growth and had the largest positive slope

of any of the identified group. Further work is necessary to better understand ELLs growth and the factors that optimize their language and literacy skill development.

While additional research would be beneficial to understand the differences observed, it would also be worthwhile to extend the present study to follow participating children into elementary school and beyond to replicate previous research regarding the predictive reliability of children's alphabet knowledge in terms of their later reading abilities (Hammill, 2004; Leppänen et al., 2008; Muter & Diethelm, 2001; National Institute for Literacy, 2008; Scarborough, 1998; Snow et al., 1998). More specifically, it would be interesting to follow the ELLs from this study to track their trajectories of growth as they learn to read. Davison and colleagues (2004) report that ELLs tend to struggle even after years of instruction and intervention. However, the results of this study were mixed in terms of the performance of ELLs compared to English-only peers. Additional research as well as more longitudinal data would be beneficial in further understanding the needs of young ELLs as they transition from early literacy to reading instruction. Similarly, additional longitudinal data would be beneficial in validating the work of Lyytinen and colleagues (2000) regarding the importance of trajectories of children's early literacy skill development and growth in terms of their later reading achievement.

Conclusions and Implications

The results of the study lead us to promising, expected, and surprising conclusions and implications that enhance the existing literature base regarding children's letter knowledge as a component of early literacy skill development. The first conclusion is that when children learn the letters of the alphabet, age matters. As was previously discussed, children's alphabet knowledge varied according to a number of identified variables, with age being the most prominent and explaining the largest portion of variation, a consistent finding in the literature

(Dodd & Carr, 2003; Justice, Invernizzi, Gell, Sullivan, & Welsh, 2005; U.S. Department of Education, 2001; Worden & Boettcher, 1990). This further substantiates the developmental process of language and literacy development (Missall et al., 2007; Riley, 1996). This study was able to assess children's alphabetic knowledge growth across an academic year while they participated in classrooms with focused early literacy instruction. Overall children participating in the project made sizable gains in their ability to recognize and identify letters of the alphabet, which has been shown to be one of the strongest predictors of later reading ability (Snow, Burns, & Griffin, 1998). The implication for instruction is that although statistical significance of the results was mixed, the practical significance should not be overlooked. The growth observed in the current study is particularly significant as most of the children who participated in the Wy-ERF project and are included in this study are from low socioeconomic homes. There is substantial research indicating that children from lower income homes tend to be significantly behind their peers and at greatest risk in terms of later reading and academic achievement (Arnold & Doctoroff, 2003; Bradley & Corwyn, 2002; Diamond et al., 2008; Hart & Risley, 1995; Massetti, 2009; Molfese, Beswick, Molnar, and Jacobi-Vessels, 2006; Raz & Bryant, 1990). The results of this study as well as other previously published work (Abbott et al., 2011) illustrate that the children who were enrolled in these classrooms made gains across a number of early literacy skills and as a result were better prepared to enter kindergarten with the early literacy skill set needed to meet kindergarten literacy expectations. Therefore the instructional recommendation is that it is critical for preschool-aged children to receive quality alphabet knowledge instruction during their formative years.

The results of the study clearly conclude that the TOPEL was able to accurately differentiate students based on their letter knowledge. In this study, the TOPEL was used to

identify at-risk children and resulted in statistically significant groups in terms of children's letter knowledge, regardless of home language background. While Muter and Diethelm (2001) have stated that screening tools developed for English-only populations can be appropriately used with students from ELL backgrounds, the results of this study were surprising in the lack of significant differences based on children's language backgrounds. Similarly, the observations from this study, specific to the trajectory of growth for children who were identified as both ELL and below-benchmark were particularly intriguing. While there are a number of statistical explanations that could at least in part explain the growth observed, the outcomes for this particular group of children are both surprising and promising in contrast to research that has consistently demonstrated the academic struggles of ELLs (Davison et al., 2004; Farver et al., 2009; Snow, et al., 1998). Therefore the instructional implication for English-only and ELL children is that the assessment tool should be carefully chosen. The assessment used to identify children who need additional support is critical to determining the appropriate instructional support children need to move into the average range.

A further conclusion is that quality of classroom instruction potentially affects child outcomes. For children identified as below-benchmark, or at-risk, growth and progress were measured across seven time points and compared based on the quality of classroom instruction they received. While significant differences were not observed based on quality, positive trends were seen for all groups. Again, there are a number of factors in terms of the procedures and design of the study that could have limited the ability to detect statistical differences between groups. However, it is also important to recognize that the expectations of the Wy-ERF project for all classrooms were particularly high. Due to high federal standards for ERF, the Wy-ERF staff set stringent criteria in terms of the quality of instruction expected in the classrooms.

Although a number of classrooms were initially unable to meet the specified goals, the project provided substantial resources designed to help classroom teachers in their implementation of literacy instruction throughout the day. For example, classroom teachers received at least four hours a week of mentoring with their Tier-1 coaches that focused on planning and implementing lesson plans based on project goals and expectation. As a result, all of the children in the study, including those identified as at-risk, made progress in terms of their kindergarten readiness. Therefore, the instructional recommendation would be that preschool programs invest sufficient professional development and coaching to create an instructional environment in which most all children reach academic benchmark and goals as was seen in Wy-ERF.

While additional research is needed to further understand the key components of instruction as well as individual child factors that play a role in early literacy and alphabet knowledge, the results of this study, which represent one component of the Wy-ERF project, are promising. The children who participated in the project showed growth across a number of early literacy skills (Abbott et al., 2011) and were prepared to enter kindergarten with a solid foundation of pre-reading skills necessary for later reading and academic success.

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Appendix A

Early Reading First
Research Consent Form for Parents

Dear Parent:

Your child's classroom is participating in Early Reading First, a new program that is designed to enhance children's language and early reading skills. As part of this program, your child will participate in many activities to promote learning. And, several times each year, your child will take part in developmental tests related to language and reading. Your child's teachers will use these tests to make sure the program is working for your child.

In addition, we are asking your permission to include your child's test data, other information, and academic video clips in a study of the Early Reading First Program. This study will be important to show that Early Reading First is effective in helping children learn, and to discover how the program can become even more helpful. We hope you will give consent for your child's assessments to be included in this study. Even if you do not consent, though, your child will still be able to take part in the Early Reading First Program.

What does this study involve? If you consent, first we would ask you to answer a short questionnaire about your family. This questionnaire will take about 5 minutes. Second, we would record information from the developmental assessments your child receives in the Early Reading First Program. Third, during the study, we will be collecting video clips of instruction to create a teacher resource guide of good instructional practice. With permission, your child may appear in these video clips. Finally, we would ask your child's program to give us information about your child's attendance, your own attendance at activities for parents, and any special needs or services your child might have.

Are there any risks in this research? We don't believe this study will involve any risks for you or your child. If you have any concerns, you may contact us at any time (see phone numbers at the end of this form). Also, if you would like to withdraw your consent at any time, you have the right to do that.

Is there any payment for participation? There will not be any payment for this study.

What are the benefits of being in this study? We believe this study will provide valuable information for improving Early Reading First Programs and for demonstrating the importance of these programs for young children.

What information will we ask for? As described above, we will ask you to complete a 5-minute questionnaire and will ask your child's program to share information from child assessments, attendance records, and records of children's special needs, if any.

How will we protect your privacy? Everything we learn from you and your child's Early Reading First program is strictly confidential. We will not share the information with anyone outside our research staff, with one exception. Our study data may be reviewed by officials at the University of Kansas who make sure that research is done in an ethical and legal way, and that participants are treated fairly.

When we report the results of this study, you and your child will never be named or identified in any way. By signing this consent form, you give us permission to use and share this information, within the limits described above, at any time in the future.

If you give consent now, can you change your mind later? Yes. You are always free to withdraw your consent, without any type of penalty. Even if you do not give consent for this research study, your child can still participate fully in the classroom and receive the benefits of the Early Reading First program.

We will do our best to answer any questions you might have now or at any time during the study -- even after the study is finished. So, please feel free to call us at 913-321-3143. In addition, if you have additional questions about your rights as a research participant or feel you have suffered an injury as a result of your participation in this research, you may contact David Hann, Coordinator of the Human Subjects Committee at KU, 785-864-7429.

We hope you will decide to be part of our project, and that it will be a good experience for you and your child. If you would like to participate, please sign below and keep one copy for yourself. Thanks very much.

Sincerely,

Dr. Mary Abbott, Project Director
Dr. Jane Atwater, Director of Evaluation

Dr. Juin Lui, Coordinator
Dr. Judy Carta, Research Advisor

913-321-3143
Juniper Gardens Children's Project
University of Kansas
650 Minnesota Ave., Kansas City, KS 66101

==========

I have read the information in this form (or, it has been read to me), and have had a chance to ask questions. I have received answers to any questions I had about information that will be used and shared in this study. I know that the information about me and my child will be kept private.

I give permission for information about my child to be included in this study, knowing that I can withdraw my consent if I decide to. I also agree to the use and sharing of my information as described above. By signing this, I verify that I am at least 18 years of age and have received a copy of this consent form to keep.

_____ _____
Name of Child (Please print clearly) Child's Birth Date

_____ _____
Parent's Signature Date Signed

Appendix B

Today's Date: _____

Early Reading First – Family Survey

These questions will help us learn about the children in the classroom and the concerns of parents. Thanks very much for your time and your help! If you have more than one child in the Early Reading First classrooms, please answer questions on this page separately for each child.

Child 1: Birth date: ____/_____/_____ Gender: Boy ☐ Girl ☐

Child 2: Birth date: ____/_____/_____ Gender: Boy ☐ Girl ☐

3. How would you describe your children's ethnicity? Please check all that apply:

Child 1:
☐ African / African-American
☐ Asian / Asian-American
☐ Caucasian
☐ Hispanic / Latino
☐ Native American
☐ Other – Please list: _____

Child 2:
☐ African / African-American
☐ Asian / Asian-American
☐ Caucasian
☐ Hispanic / Latino
☐ Native American
☐ Other – Please list: _____

4. Please indicate your relationship to…

Child 1:
☐ Mother/father
☐ Grandparent
☐ Other relative
☐ Foster parent
☐ Other – Please describe: _____

Child 2:
☐ Mother/father
☐ Father
☐ Other relative
☐ Foster parent
☐ Other – Please describe: _____

5. Some children write or pretend to write words.
How often has **Child 1** done this? ☐ Never ☐ Once or twice ☐ Sometimes ☐ Often
How often has **Child 2** done this? ☐ Never ☐ Once or twice ☐ Sometimes ☐ Often

6. Do your children ever look at a book with pictures and pretend to read?
Does **Child 1** ever do this? ☐ YES ☐ NO Does **Child 2**? ☐ YES ☐ NO

7. *In the past week*, how many times have you (or someone in your family) read to your children?
Child 1 ☐ Not at all ☐ Once or twice ☐ 3 or more times ☐ Every day
Child 2 ☐ Not at all ☐ Once or twice ☐ 3 or more times ☐ Every day

The rest of the questions, refer to all your children who are in Early Reading First.

8. About how many children's books do you own?
☐ 1 -10 ☐ 11 – 25 ☐ 26 – 50 ☐ More than 50

9. What languages are your children's books written in?
Check all that apply: ☐ English ☐ Spanish ☐ Other

10. ***During the past week,*** **how often have you (or someone in your family) done any of the following things with your children?**

Please check one column for every question:

	None	1 or 2 Times	3 or More Times
A. Told your child a story			
B. Taught your child letters, words, or numbers			
C. Taught your child songs or music			
D. Worked on arts and crafts with your child			
E. Played with toys or games together indoors			
F. Played a game sport, or exercised together			
G. Took your child along while doing errands like going to the post office, the bank, or the store			
H. Involved your child in household chores like cooking, cleaning, setting the table, or caring for pets			

12. Have you (or anyone in your family) started teaching your children letters in the alphabet or do you think it's better to wait until they get to kindergarten and let the teacher do that?

☐ Have started teaching the alphabet at home
☐ Plan to start teaching at home before my child starts kindergarten
☐ Believe it's better to wait for the teacher to teach the alphabet in kindergarten

13. What is the highest level of education that you have completed?

☐ Grade less than high school
☐ Some high school
☐ GED
☐ High school diploma
☐ Some education after high school
☐ Associates degree (AA)
☐ College degree (BA/BS)
☐ Graduate degree

14. Please indicate the number of people who live in your home:

Number of children (under the age of 18) _____
Number of adults (18 or older) _____

15. Please check the amount that best describes the income for your household last year (2007). This would include salaries of any people in your household who work.

☐ Less than $10,000
☐ $10,000 – $12,999
☐ $13,000 – $15,999
☐ $16,000 – $18,999
☐ $19,000 – $21,999
☐ $22,000 – $24,999
☐ $25,000 – $27,999
☐ $28,000 – $30,999
☐ $31,000 – $33,999
☐ $34,000 – $36,999
☐ $37,000 – $39,999
☐ $40,000 or more

Home Language Survey

Child's Name: _____

Dear Parent:

Please answer these questions, to help us learn the best way to work with your child and to tell us what kind of information you would like from Early Reading First.

1. Does anyone in your home speak Spanish? Yes____ No ___

   If your child hears or speaks any languages other than English and Spanish at home, please list those languages here:

2. What languages do you use when you talk to your child? *(Circle one)*

English Only	Mostly English	English/ Spanish Equally	Mostly Spanish	Spanish Only	Mostly Another Language

3. What languages do other people at home use when they talk to your child? *(Circle one)*

English Only	Mostly English	English/ Spanish Equally	Mostly Spanish	Spanish Only	Mostly Another Language

4. What languages does your child use when talking at home? *(Circle all that apply)*

   English Spanish Another language

5. What language do you think your child is most comfortable with now? *(Circle one)*

   English Spanish Another language

6. What language would you prefer for reports of your child's assessments? *(Circle one)*

   English Spanish Both English and Spanish

7. What language would you like for books that are sent home with your child? *(Circle one)*

   English Spanish Either Some of both English and Spanish

Appendix C
Letter Names

Directions

1. Tell the child to put his or her finger on the first letter at the top of the page. Direct the child to touch the letters in the proper sequence and make sure the child does not get off track. Some children may require assistance with pointing, or you may point to the letters yourself.
2. Use a piece of paper to show only one line at a time for those children who may be distracted by so many letters on the alphabet page.
3. Say, "**I would like for you to point (or I will point) to each letter. As you point to the letter, tell me the name of that letter. If you come to a letter that you do not know, you may say 'I don't know' and move to the next letter. Ready? Let's begin…"**
4. If the child does not respond, mark a slash through the letter that is not identified correctly and go on to the next letter. You may move on to the next letter by saying, **"Tell me the name of this letter"**. Self-corrections are counted as correct answers. If the task becomes too difficult, stop the task and indicate discontinued on the score sheet.
5. Count the number of letters that the child identified correctly. Record that number on the score sheet.
6. Only children who correctly name 16 or more upper-case letters proceed to lower-case alphabet recognition.

Letter Naming Scoring

Date: _____

Child ID: _____

Circle the correct answer = 0
Put a slash through incorrect answer = /

Total Correct Upper Case: _____ Spanish: _____ Blend: _____
Total Correct Lower Case: _____

M	G	S	I
B	X	L	Q
H	W	T	R
J	C	O	V
P	F	D	U
A	Y	N	Z
K	E		
s	g	m	i
b	r	l	f
h	w	t	q
j	c	o	v
p	x	d	u
a	y	n	z
k	e		

Appendix D

Early Reading First Fidelity of Implementation – Center Time (2008-2009)

Classroom Teachers: _____

	Teacher Behavior	A	B	C	D
1.	Teachers have center materials listed in the lesson plan ready.				
2.	A teacher discusses with students prior to center time, the centers that are operational & activities in each center.				
3.	There is a quick, orderly transition activity that takes less than 5 minutes.				
4.	There is an methodology for moving between centers that is reinforced by teachers.				
5.	Literacy & writing related activities are included in every open center.				
6.	Teacher encourages children to participate small group or individualized writing &/or ABC use.				
7.	Throughout center time, teachers provides positive reinforcement & appropriate behavior management techniques.				
8.	Teachers extend the use of oral language (e.g., infusing new vocabulary, extend conversation, encourage theme based exploration).				
9.	Clean-up has a specific transition (song, poem, etc.) that is quickly and smoothly executed within 5 minutes.				
	Total				
	Student Behavior				
1.	Students are able to choose center activities				
2.	Students participate in writing activities				
3.	Students are engaged in center activities throughout center time.				
4.	Students actively participate in clean-up.				

Date: _____ School: _____ Classroom: _____Observer: _____

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required center time: minimum of 1 hour: Actual center time _____

Comments:

Early Reading First Fidelity of Implementation – Circle (2008-2009)

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teacher has reviewed the lesson & has supplies ready when lesson begins.				
2.	2 minutes or less is spent in morning greeting and opening song.				
3.	5 minutes or less is spent on an opening activity that incorporates a quick review of a letter knowledge skill or review of vocabulary (e.g., saying the letters in the month, finding a letter of the week in the calendar).				
4.	Lesson plans indicate that the teacher has a specific purpose related to developing oral language (e.g., new vocabulary, talk about pictures in a book, listen to a song to learn something new).				
5.	The teacher introduces the oral language activity by linking it to the purpose stated in the lesson plan.				
6.	The teacher and students practice the oral language activity using group responding (2 or more children responding at one time).				
7.	Throughout the lesson, the circle teacher provides positive reinforcement & appropriate behavior management techniques.				
8.	Throughout the lesson, the non-circle teacher provides positive reinforcement & appropriate behavior management techniques.				
9.	The transition to or from Circle Time has a specific song, poem, etc. that is quickly and smoothly executed in less than 2 minutes.				
10.	The teacher uses ELL strategies (simple language, slower rate of speech, reduce amount of information, encourages use of child's first language, and provides visual cues).				
	Total				
	Student Behavior				
1.	Students listen to the presentation.				
2.	Students have the opportunity for individual practice.				
3.	Students are responsive to the teachers (e.g., quiet down when asked to).				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required circle time: maximum of 15 minutes: Actual circle time _____

Comments:

Early Reading First Fidelity of Implementation – Small Group (2008-2009)

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teachers have reviewed the lesson & have supplies ready when lesson begins.				
2.	Lesson plans indicate that the teachers have small group activities planned that include a phonological awareness/letter knowledge, math, and shared reading activity (from the curriculum or teacher planned).				
3.	The teachers introduce the lessons stated on the lesson plan.				
4.	It is apparent that the teachers have differentiated instruction either by having a variety of activities for variable grouping or different forms of the same activity for ability grouping.				
5.	During the lesson, the teacher models as needed (I do it).				
6.	The teacher provides guided practice as needed (We do it).				
7.	The teacher provides opportunity for independent student practice (You do it).				
8.	As students or teacher move between small group periods, there is an orderly, short transition (2 minutes or less).				
9.	There is a methodology for keeping track of time during each small group.				
10	Throughout the lesson, the small group teacher provides positive reinforcement & appropriate behavior management techniques.				
11	The transition to or from Small Group Time has a specific song, poem, etc. that is quickly and smoothly executed in less than 2 minutes.				
12	The teachers are able to verbalize the methodology for grouping children.				
	Total				
	Student Behavior				
1.	Students listen to the presentation.				
2.	Students have the opportunity for individual practice.				
3.	Students are responsive to the teachers (e.g., quiet down when asked to).				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required small group time: maximum of 15 minutes per session: Actual small group session time ____
Comments:

Early Reading First Fidelity of Implementation - Story Time (2008-2009)

Classroom teachers: _____

Date: _____ School: _____ Classroom: _____ Observer:_____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teacher has previously read and reviewed the book & activity & supplies are ready when lesson begins.				
2.	Lesson plans state that the teacher has a specific purpose for the book reading (e.g., concepts of print, story grammar components, student read, phonological awareness). Teacher implements the lesson plan.				
3.	Teacher reads the title, author, & illustrator.				
4.	Teacher activates prior knowledge by encouraging students to predict, discuss, introduce/review vocabulary, or ask questions about the book that might relate to their lives.				
5.	Teacher uses facial expressions &/or different tones for characters.				
6.	Teacher pauses during the reading to ask open-ended questions &/or encourage the children to fill in predictable phrases. (on a familiar book)				
7.	Teacher involves children in activities that extend the book (e.g., story map, role playing, vocabulary, categorizing, story comprehension).				
8.	After the reading, the teacher mentions when & where the book will be available for children to explore independently.				
9.	Throughout the lesson, the story time teacher provides positive reinforcement & appropriate behavior management techniques.				
10	Throughout the lesson, the non-storybook reading teachers provides positive reinforcement & appropriate behavior management.				
11	When appropriate, non-storybook reading teachers participate in the discussions & storybook reading activities.				
12	The transition to or from Story Time has a specific song, poem, etc. that is quickly and smoothly executed in less than two minutes.				
	Total				
	Student Behavior				
1.	Students are attentive as the story is being read.				
2.	Students respond to teacher requests.				
3.	Students respond academically.				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required story time: maximum of 15 minutes: Actual story time _____

Comments:

Early Reading First Fidelity of Implementation – Center Time (2009-2010)

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____Observer: _____

	Teacher Behavior	A	B	C	D
1.	Teachers have center materials listed in the lesson plan ready.				
2.	A teacher discusses with students prior to center time, the centers that are operational & activities in each center.				
3.	There is a quick, orderly transition activity that takes less than 5 minutes.				
4.	There is a methodology for moving between centers that is reinforced by teachers.				
5.	Literacy & writing related activities are included in every open center.				
6.	Teacher encourages children to participate small group or individualized writing &/or ABC use.				
7.	Throughout center time, teachers provides positive reinforcement & appropriate behavior management techniques.				
8.	Teachers extend the use of oral language (e.g., infusing new vocabulary, extend conversation, encourage theme based exploration).				
9.	Clean-up has a specific transition (song, poem, etc.) that is quickly and smoothly executed within 5 minutes.				
10.	When working with ELLs, teacher uses ELL strategies (e. g., gestures, slower speech, reduced information, provides visual cues).				
	Total				
	Student Behavior				
1.	Students are able to choose center activities				
2.	Students participate in writing activities				
3.	Students are engaged in center activities throughout center time.				
4.	Students actively participate in clean-up.				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required center time: minimum of 1 hour: Actual center time _____

Comments:

Early Reading First Fidelity of Implementation – Circle (2009-2010)

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teacher has reviewed the lesson & has supplies ready when lesson begins.				
2.	2 minutes or less is spent in morning greeting and opening song.				
3.	5 minutes or less is spent on an opening activity that incorporates a quick review of a letter knowledge skill or review of vocabulary (e.g., saying the letters in the month, finding a letter of the week in the calendar).				
4.	Lesson plans indicate that the teacher has a specific purpose related to developing oral language (e.g., new vocabulary, talk about pictures in a book, listen to a song to learn something new).				
5.	The teacher introduces the oral language activity by linking it to the purpose stated in the lesson plan.				
6.	The teacher and students practice the oral language activity using group responding (2 or more children responding at one time).				
7.	Throughout the lesson, the circle teacher provides positive reinforcement & appropriate behavior management techniques.				
8.	Throughout the lesson, the non-circle teacher provides positive reinforcement & appropriate behavior management techniques.				
9.	The transition to or from Circle Time has a specific song, poem, etc. that is quickly and smoothly executed in less than 2 minutes.				
10.	The teacher uses ELL strategies (simple language, slower rate of speech, reduce amount of information, encourages use of child's first language, and provides visual cues).				
	Total				
	Student Behavior				
1.	Students listen to the presentation.				
2.	Students have the opportunity for individual practice.				
3.	Students are responsive to the teachers (e.g., quiet down when asked to).				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
Student Scores			

Required circle time: maximum of 15 minutes: Actual circle time _____

Comments:

Early Reading First Fidelity of Implementation – Small Group (2009-2010)
Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teachers have reviewed the lesson & have supplies ready when lesson begins.				
2.	Lesson plans indicate that the teachers have small group activities planned that include a phonological awareness/letter knowledge, math, and shared reading activity (from the curriculum or teacher planned).				
3.	The teachers introduce the lessons stated on the lesson plan.				
4.	It is apparent that the teachers have differentiated instruction either by having a variety of activities for variable grouping or different forms of the same activity for ability grouping (e.g., use of the ESL bridge)				
5.	During the lesson, the teacher models as needed (I do it).				
6.	The teacher provides guided practice as needed (We do it).				
7.	The teacher provides opportunity for independent student practice (You do it).				
8.	As students or teacher move between small group periods, there is an orderly, short transition (2 minutes or less).				
9.	There is a methodology for keeping track of time during each small group.				
10	Throughout the lesson, the small group teacher provides positive reinforcement & appropriate behavior management techniques.				
11	The transition to or from Small Group Time has a specific song, poem, etc. that is quickly and smoothly executed in less than 2 minutes.				
12	The teachers are able to verbalize the methodology for grouping.				
	Total				
	Student Behavior				
1.	Students listen to the presentation.				
2.	Students have the opportunity for individual practice.				
3.	Students are responsive to the teachers (e.g., quiet down when asked to).				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
C			
Student Scores			

Required small group time: maximum of 15 minutes per session: Actual small group session time ____
Comments:

Early Reading First Fidelity of Implementation - Story Time (2009-2010)

Classroom teachers: _____

Date: _____ School: _____ Classroom: _____ Observer:_____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teacher has previously read and reviewed the book & activity & supplies are ready when lesson begins.				
2.	Lesson plans state that the teacher has a specific purpose for the book reading (e.g., concepts of print, story grammar components, student read, phonological awareness). Teacher implements the lesson plan.				
3.	Teacher reads the title, author, & illustrator.				
4.	Teacher activates prior knowledge by encouraging students to predict, discuss, introduce/review vocabulary, or ask questions about the book that might relate to their lives. (e.g., target/rare words)				
5.	Teacher uses facial expressions &/or different tones for characters.				
6.	Teacher pauses during the reading to ask open-ended questions &/or encourage the children to fill in predictable phrases. (on a familiar book)				
7.	Teacher involves children in activities that extend the book (e.g., story map, role playing, vocabulary, categorizing, story comprehension).				
8.	After the reading, the teacher mentions when & where the book will be available for children to explore independently.				
9.	Throughout the lesson, the story time teacher provides positive reinforcement & appropriate behavior management techniques.				
10	Throughout the lesson, the non-storybook reading teachers provides positive reinforcement & appropriate behavior management.				
11	When appropriate, non-storybook reading teachers participate in the discussions & storybook reading activities.				
12	The transition to or from Story Time has a specific song, poem, etc. that is quickly and smoothly executed in less than two minutes.				
	Total				
	Student Behavior				
1.	Students are attentive as the story is being read.				
2.	Students respond to teacher requests.				
3.	Students respond academically.				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher	Total possible	Total # received	Fidelity percentage
A			
B			
C			
D			
Student Scores			

Required story time: maximum of 15 minutes: Actual story time _____

Comments: